FARLOW LIBRARY
HARVARD UNIVERSITY

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB

Conducted and published for the Club, by

MERRITT LYNDON FERNALD, Editor-in-Chief

JAMES FRANKLIN COLLINS
CHARLES ALFRED WEATHERBY } Associate Editors
LUDLOW GRISCOM

VOLUME 35

1933

The New England Botanical Club, Inc.
8 and 10 West King St., Lancaster, Pa.
Room 1001, 53 State St., Boston, Mass.

JAN 13 1933

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB

Conducted and published for the Club, by

MERRITT LYNDON FERNALD, Editor-in-Chief

JAMES FRANKLIN COLLINS
CHARLES ALFRED WEATHERBY } Associate Editors
LUDLOW GRISCOM

Vol. 35. January, 1933. No. 409.

CONTENTS:

Recent Discoveries in the Newfoundland Flora. *M. L. Fernald* . . . 1

Aster paniculatus and some of its Relatives. *K. M. Wiegand* 16

Desmodium glabellum in northeastern Connecticut. *A. W. Upham* 38

Diarrhena festucoides again. *M. L. Fernald* 39

Ficus Carica in Massachusetts. *S. N. F. Sanford* 40

The New England Botanical Club, Inc.

8 and 10 West King St., Lancaster, Pa.

Room 1001, 53 State St., Boston, Mass.

RHODORA.—**A monthly journal of botany, devoted primarily to the flora of New England. Price, $2.00 per year, net, postpaid, in funds payable at par in United States currency in Boston; single copies (if available) 20 cents. Volumes 1-8 or some single numbers from them can be supplied only at advanced prices which will be furnished on application. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be considered for publication to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than two pages of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.**

Address manuscripts and proofs to

M. L. FERNALD, 14 Hawthorn Street, Cambridge, Mass.

Subscriptions (making *all remittances* payable to RHODORA) to

Ludlow Griscom, 8 W. King St., Lancaster, Pa., or Museum of Comparative Zoology, Cambridge, Mass.

Entered at Lancaster, Pa. Post Office as Second Class Mail Matter.

INTELLIGENCER PRINTING COMPANY

Specialists in Scientific and Technical Publications

EIGHT WEST KING ST., LANCASTER, PA.

CARD-INDEX OF NEW GENERA, SPECIES AND VARIETIES OF AMERICAN PLANTS, 1885 TO DATE.

For American taxonomists and all students of American plants the most important supplement to the Index Kewensis, this catalogue in several ways exceeds the latter work in detail, since it lists not only the flowering plants, but ferns and other vascular cryptogams, and includes not merely genera and species, but likewise subspecies, varieties and forms. A work of reference invaluable for larger herbaria, leading libraries, academies of sciences, and other centers of botanical activity. Issued quarterly, at $22.50 per 1000 cards.

GRAY HERBARIUM of Harvard University,
Cambridge, Mass., U. S. A.

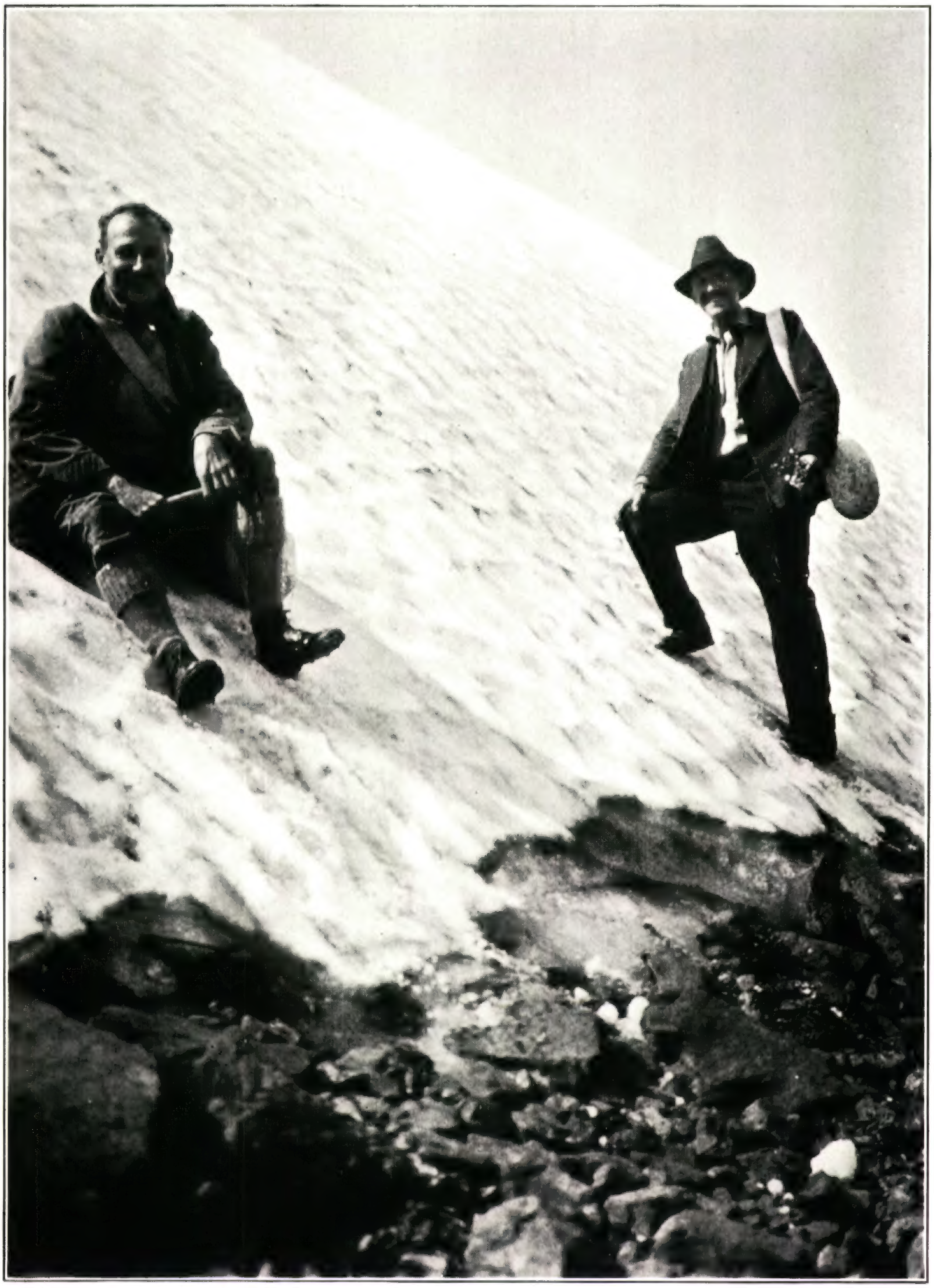
CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. DAY. Leatherette. Pocket size. Invaluable for collector's memoranda and herbarium records. Published and sold by the GRAY HERBARIUM, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

MEMOIRS OF THE GRAY HERBARIUM. A series of illustrated quarto papers issued at irregular intervals, sold separately.

No. III. The Linear-leaved North American Species of Potamogeton, Section Axillares, by M. L. Fernald. 183 pp., 40 plates, 31 maps. 1932. $3.00.

Gray Herbarium of Harvard University, Cambridge, Mass.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3/4 in. 1 year $4.00, 6 months $2.50.



Bayard Long (right) and John Milton Fogg, jr. (left) on the north slope of The Tableland, Bonne Bay.

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 35. January, 1933. No. 409.

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CI.

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. Fernald

(Plates 232–271)[1]

Part I. Journal of 1926 and 1929

I have already published two extended accounts[2] of botanical work in Newfoundland and some other papers[3] in which the great interest and the relic endemism or isolation of plants in Newfoundland has been much emphasized. Very briefly summarized some of the many

[1] The snap-shots of topography, unless otherwise stated, are my own. The photographs of plants have been prepared, with aid from the Milton Fund for Research of Harvard University, by Dr. Hugh M. Raup or by Mr. Charles Bullard, whose unlimited kindness I wish here to acknowledge. The large cost of reproduction of the plates has been wholly met by my ever loyal companion, Mr. Bayard Long. The preparation of the maps has been possible through the Milton Fund for Research. The polar projection used in some maps is Goode's No. 201 Pc, copyrighted and published by the University of Chicago. Some plates, cited in early parts of the paper, will appear in later instalments, where more appropriate.

[2] *A Botanical Expedition to Newfoundland and Southern Labrador* (Contrib. Gray Herb. n. s. no. xl.), Rhodora xiii. 109–162, plates 86–91 (1911).

Two Summers of Botanizing in Newfoundland (Contrib. Gray Herb. lxxvi.) Rhodora xxviii. 49–63, 74–87, 89–111, 115–120, 145–155, 161–178, 181–204, 210–225, 234–241, plates 153–155 (1926, 1927).

[3] *The Contrasts in the Floras of Eastern and Western Newfoundland.* Am. Journ. Bot. v. 237–247 (1918).

Persistence of Plants in Unglaciated Areas of Boreal America (Mem. Gray Herb., no. ii.) Mem. Am. Acad. xv. no. iii. (1925).

Some Relationships of the Floras of the Northern Hemisphere. Proc. Intern. Congr. Pl. Sci. ii. 1487–1507 (1929).

Unglaciated Western Newfoundland. Harvard Alumni Bull. Jan. 23, 1930 (with photographs of characteristic topography).

Specific Segregations and Identities in some Floras of Eastern North America and the Old World (Contrib. Gray Herb. xciii.), Rhodora, xxxiii. 25–63, plate 204 (1931).

points of phytogeographic interest are: (1) the restricted areas in Newfoundland of at least the later glaciations of the Pleistocene, with the result that a large element of the flora seems to have persisted unscathed through the Pleistocene or, at any rate, through the Wisconsin (or Labradorean) glaciation; (2) the high degree of endemism in the flora of the West Coast, from Cape Ray to Cape Norman; (3) the identity or close affinity of much of the flora of western Newfoundland with that of the Arctic Archipelago and arctic Eurasia and, in some cases, with that of the Cordilleran and Pacific regions of North America; (4) the representation of a number of groups now found mostly in the Southern Hemisphere and the Tropics, but also sharing Newfoundland with Nova Scotia and the Coastal Plain of the eastern United States, a flora apparently of Cretaceous origin which had its interchanges along the now submerged Cretaceous and Tertiary continental shelf; (5) the occurrence, especially on the Avalon Peninsula, of a considerable Atlantic European element unknown elsewhere in eastern America; (6) these isolated or relic elements and the endemic species occurring mostly as localized and often very restricted colonies in the widely diffused and everywhere common and comparatively uninteresting elements of the Canadian and Hudsonian forests, bogs, shores and barrens.

To the field-botanist with temperamental ability to take things as they come, to work under disadvantageous conditions, to overlook the discomforts of perpetually fighting swarms of black-flies and mosquitoes, and to maintain a cheerful enthusiasm in spite of frequent deficiencies of diet and the regular failure of the announced schedules of boats to meet their obligations, western Newfoundland still offers almost virgin and unspoiled territory for fascinating exploration and important botanical discovery. The last general account of the work of parties of which I had the good fortune to be a member covered the summers of 1924 and 1925. The summer of 1926 was largely taken up for botanists of eastern America by the International Congress at Ithaca; but, having a short period of early autumn still available, my ever-ready companion, Mr. Bayard Long, and my genial student, now Dr. John Milton Fogg, joined me after the Ithaca meetings and we went, via Montreal, on one of the sumptuous steamships of the Clarke line to Corner Brook at the head ("bottom") of the Bay of Islands, with the avowed purpose of locating at Lark Harbor, at the southern entrance to the Bay of Islands, thence, when the weather

proved propitious, to go by motor boat southward along the outer cliff-wall to Serpentine River whence we could make a simple approach to the unbotanized Lewis Hills, the highest mountains (2700 ft.) of Newfoundland. We planned to finish the trip by proceeding slightly east of Cape Ray to the region of Burgeo in order to get some idea of the flora of a thoroughly glaciated granitic area, to contrast with the flora of the unglaciated or, at least, recently unglaciated West Coast.

Entering Bay of Islands, we longed immediately to get at the sheer outer wall of trap rock which, broken only by tiny coves, extends far south, to Bluff Head. Passing Lark Harbor and steaming to the head of Humber Arm, we were there met by a motor boat sent in by our prospective host, Mr. Moses G. Sheppard, proprietor of the extensive fisheries at Lark Harbor; and toward mid-afternoon we started back about thirty miles over the steamship's route, to Lark Harbor. The afternoon was windy, with black clouds overhanging the precipitous (nearly 2000 feet high) walls of Blomidon, and, in spite of sweaters and oilskins, we fully approved the local pronunciation, "Blow-me-down." Passing the inner islands of the Bay and the outer cliffs of Blomidon in the evening light, we gazed in awe at the mountain-walls and, reaching Lark Harbor, were greeted from the wharf with the informative: "Well, gentlemen, dis is w'ot we calls de Bay of Hilands." Either way we thought of it the name seemed wholly appropriate, but somehow we got a feeling that we had just drifted ashore and were not supposed to know where we had landed. It was a fortunate haven, however: Mr. Sheppard, a progressive man of fine physique and sturdy character, genial, wholesome and hospitable, and busy through a long day; Mrs. Sheppard, a women of unusual poise and background, who, with at least two of the daughters, had seen much of the outside world; the twin sons and our efficient skipper, Pennell, alert and, like the others, anxious to make our botanizing successful. The Sheppards also had a fine garden of many vegetables, one of the desiderata in many Newfoundland ports, and we were inclined, as we have not always been at fishing ports, to linger over our meals.

When we awoke on the morning of August 30th, the weather was "dirty" and, in fact, for a full week we did not have a truly "civil" day. We botanized along the shore toward York Harbor, visited some of the islands, spent a day on the inner slope of Lark Mountain,

and on one bright but very windy day Long and Fogg crossed over to explore the desert-like serpentine ridge which flanks the North Arm; but at no time would the wind let up and give us the calm weather necessary if we were to follow the outer sea-wall in a small boat and make a safe entry into the Serpentine. Waghorne had botanized about Lark Harbor, Eames and Godfrey had made a center at the copper mine above York Harbor, and Mackenzie and Griscom had got at Blomidon from Frenchman's Cove; while Wiegand and I, in 1910, had twice visited Blomidon from Benoit's Cove. Consequently, lingering at Lark Harbor merely to take advantage of calm weather, we did not undertake extensive trips away from headquarters. But these short excursions into the neighboring region yielded fair returns, though, of course, Waghorne and his successors had already secured the more interesting species.

The season had been unduly cold; snow of the preceding winter lingered in early September on many slopes; the general verdict was that there had been no summer; and we heard many accounts of unmelted snow-banks extending down to the sea along the Straits of Belle Isle. The vegetation in early autumn was in the usual midsummer state; the plants which usually flower in late July or early August were just coming into bloom. The immediate neighborhood of Lark Harbor, we had been told, would be quite unspoiled and an ideal place for botanists, "absolutely wild, with lots of sheep and goats." The sheep and goats had had full control; but from among the meagre remnants of vegetation we were able to pull out a solitary *Botrychium simplex*[1] and a few other vouchers which even they had missed.

The inner slope of Lark Mountain, however, had good fences near the base and we soon got into wholly primitive mountain-woods, with *Aster acuminatus* and some other Canadian forest types which are not often seen in Newfoundland; in fact, the *Aster* had been known on the Island only from thickets at the southwest corner, Port aux Basques. Passing above timber line we were out on the open wind-swept lower edge of the tableland, but instead of being arctic-alpine as, in spite of many experiences, we still somehow expected the tablelands of western Newfoundland to be, it was in some features less "alpine" than the shores of the outer Bay. A

[1] It seems unnecessary to encumber the narrative by giving the authors of species which are in the current manuals. They will be noted only in cases of change or for species not in Gray's Manual.

few "arctic-alpine" species of broad range and of general occurrence in almost any bleak or open habitat in Newfoundland were there: the inevitable *Lycopodium Selago* and *L. annotinum* var. *pungens, Juniperus communis* var. *montana, Agrostis borealis, Hierochloe alpina, Scirpus cespitosus* var. *callosus* Bigel., *Carex rariflora, C. scirpoidea, Juncus trifidus, Salix Uva-ursi, Rubus Chamaemorus, Viola labradorica, Loiseleuria procumbens, Arctostaphylos alpina, Vaccinium uliginosum* var. *alpinum* Bigel.[1] and *Diapensia lapponica.* However, these and many others, which in New England we call "arctic-alpine," are so nearly ubiquitous at all altitudes in Newfoundland that they were mostly on our "taboo-list," not to be collected unless an extraordinarily fine or exceptional specimen was found. Consequently, they failed to stir our emotions.

Far more interesting on the tableland were their more southern companions, a group of species characteristic of acid peats of New Jersey, southern New York, southern New England or Nova Scotia, here thriving, as they do on the great diorite tableland of Blomidon to the east, as well as on the high barrens of the interior, in the region of The Topsails (from Kitty's Brook and Gafftopsail east at least to the Millertown region), and in the peats at sea-level in southern Newfoundland. High up above the timber the more continuous mossy carpets were as suggestive of the New Jersey Pine Barrens as they were of the North: the flesh-pink to crimson *Aster nemoralis* and the slender *Solidago uniligulata* everywhere, with such of their regular Pine Barren associates as *Agrostis scabra* Willd., *Muhlenbergia uniflora* (Muhl.) Fern. (var. *terrae-novae* Fern.[2]), *Eriophorum tenellum* and *virginicum, Rynchospora fusca* and *alba, Carex exilis, trisperma* var. *Billingsii* and *livida* var. *Grayana* (Dewey) Fern.[3], *Juncus canadensis* (var. *sparsiflorus* Fern.[4]), *Habenaria clavellata* and *blephariglottis, Pogonia ophioglossoides, Calopogon pulchellus* (scarce), *Arethusa bulbosa, Sarracenia purpurea* and *Utricularia cornuta.* Shallow pools were filled with *Nymphozanthus variegatus* (Engelm.) Fern.,[5] *Eriocaulon septangulare* and *Potamogeton Oakesianus;* and at the margins of pools or on seepy slopes in the peat the austral *Juncus pelocarpus* abounded, with the austral genus *Xyris* represented by *X. montana* and the austral *Bartonia paniculata* by the endemic

[1] See Rhodora, xxv. 24 (1923).
[2] Rhodora, xxix. 11 (1927).
[3] Rhodora, xxviii. 8 (1926).
[4] Rhodora, xxiii. 241 (1921).
[5] Rhodora, xxi. 187 (1919).

var. *iodandra* (Rob.) Fern.,[1] while the famous Pine Barren specialty, *Schizaea pusilla* (MAP 7), nestled among the *Bartonia* and Rynchosporas.

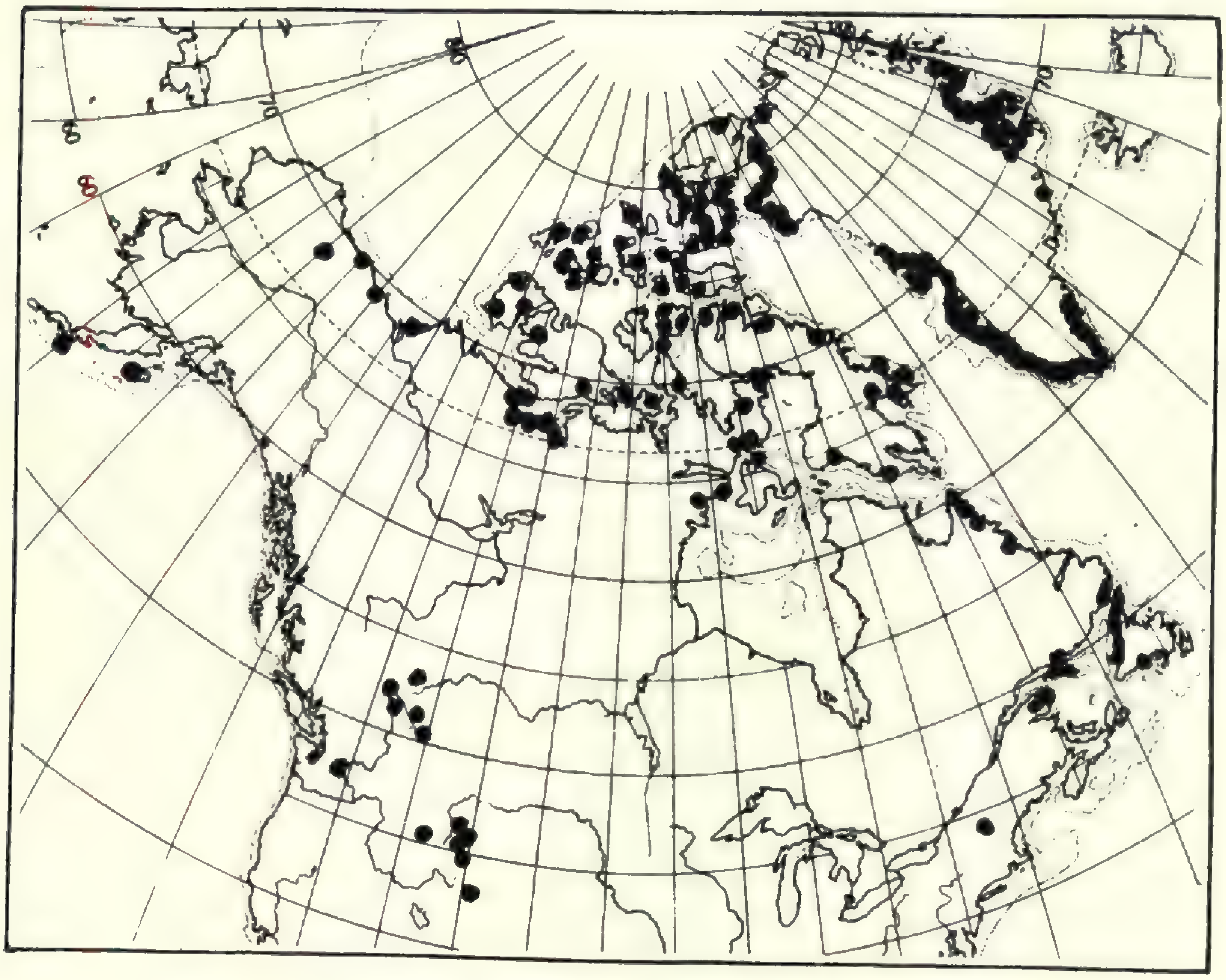
Although a novel experience for Fogg, this was an old story to Long and me; in fact, as far back as 1910 Wiegand and I had first met[2] this wholly unexpected mingling of austral and circumpolar species on the top of Newfoundland (at 2000 feet altitude) on the broad diorite tableland of Blomidon; in 1911 Bartram and I encountered it in the Quarry and Maintopsail region and Wiegand and I had an experience with it on the Avalon Peninsula; and in 1924 Long, Dunbar and I had repeated the list, with a few additional species, on the Long Range back of Port aux Basques.[3] But the dominance of this austral flora on the high tablelands of Newfoundland has not yet lost its thrill and we are repeatedly tempted to ascend new blocks of the great dissected tableland (the uplifted Cretaceous Peneplane)[4] of western Newfoundland to rediscover this amazing "alpine" flora, which to the south and east on the Island comes down to sea-level.

September 1st on Lark Mountain saw the beginning of a hectic fortnight with *Euphrasia*. In ordinary summers *Euphrasia* in Newfoundland is fully flowering in late July and early August, but the "summerless" season of 1926 was so backward that in early September the species were in the prime of flowering. In the subalpine gravels of Lark Mountain the species was *E. Williamsii* (the Newfoundland var. *vestita* Fern. & Wieg.), the dwarf species of the alpine area of the White Mountains with chocolate-purple corollas, known in its typical glabrous form also from the Shickshock Mts. of Gaspé and from headlands along the Straits of Belle Isle, and in the pubescent var. *vestita* on alpine slopes and exposed crests of western and northern Newfoundland and adjacent Quebec Labrador.

We wanted to explore the bare montane islands at the entrance to the Bay of Islands. The strong winds, however, made landing on the highest of the outermost and, consequently, the most inviting (Weebald or Guernsey, 1053 feet high), impossible; but we suceeded in making French or Tweed Island (702 feet) and, with the greatest ease, the inner and sheltered low islands (Wood's, Woody, Seal's

[1] RHODORA, xxiii. 288 (1922).
[2] RHODORA, xiii. 133 (1911).
[3] RHODORA, xxviii. 56 (1926).
[4] RHODORA, xxxiii. 37 (1931); characteristic portions of the Newfoundland tableland are shown in RHODORA, xiii. t. 87 and xxviii. t. 154.

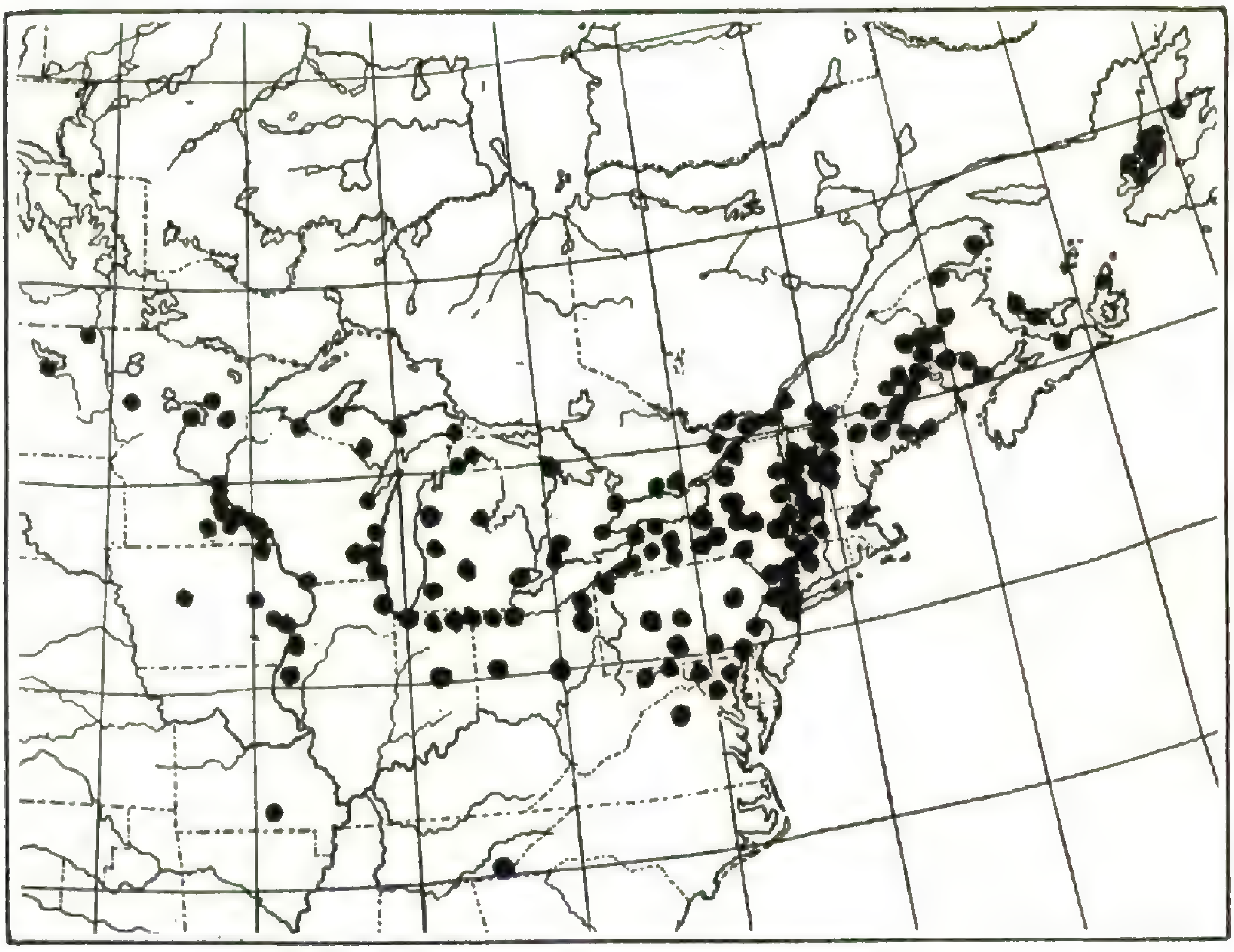
Nest and Governor). As just implied, sea-level on the outer coast is often more "alpine" than the summit-tablelands. Consequently, it was gratifying but not at all surprising to find the ledges (trap) and lower gravelly slopes of French Island carpeted by many species which occur north to latitudes 74°–85° in Greenland or Ellesmereland and which, in latitude 49°, we should expect to find only on the highest mountains: such species as *Festuca vivipara* (L.) Sm., *Luzula spicata, Silene acaulis* var. *exscapa* (All.) DC. (coming south from lat. 83°), *Draba rupestris* R. Br., and *Saxifraga aizoides* and *S. oppositifolia*



Map 1. American Range of SAXIFRAGA OPPOSITIFOLIA.

(extending south from lat. 85°, MAP 1). The arctic and subarctic *Artemisia borealis* Pall. was here, but with extraordinarily coarse leaf-segments, var. *latisecta* Fern., RHODORA, xxix. 93 (1927); and *Euphrasia* added its quota of puzzles. The endemic goldenrod of western Newfoundland, *Solidago hispida* var. *arnoglossa* Fern., RHODORA, xvii. 2 (1915), characterized by its very large narrowly obovate cauline leaves, was here well developed and so unlike the common small-leaved typical form of the species that in its extreme

development it seems very definite. Transitional material in abundance, however, found both here and in a subsequent year near Bonne Bay, constrains us to maintain it as a geographic variety rather than as a species. Another goldenrod of French Island which greatly perplexed us has the foliage of *Solidago rugosa* but the panicles so condensed that in the smallest specimens they form dense ovoid inflorescences scarcely 2 cm. in diameter. The plant seems to be *S. rugosa* "reduced to its lowest terms," so to speak, at this bleak northern limit of the species.



Map 2. Range of CYPRIPEDIUM REGINAE.

Other southern species on French Island which seemed absolutely out of place in close proximity to *Silene acaulis* and *Saxifraga oppositifolia* (MAP 1) were *Cypripedium reginae* Walt. (MAP 2) and *Habenaria orbiculata* (MAP 9). The Showy Lady's Slipper had found a protecting thicket by a stream; but *Habenaria orbiculata* was so abundant as to be almost dominant in dry peat and gravel within a stone's throw of the open shore. In New England and eastern Canada we had always thought of it as an orchid of the richest of old woodlands; but its choice of habitat on bleak French Island was only a breaking

of the ice for our next station for it. In 1929 we found it vying with the arctic *Scirpus cespitosus* var. *callosus* (MAP 10) for possession of a sphagnous pocket on the high tableland of Lookout Mountain at Bonne Bay. Yet some critics complain that habitats are not correctly stated in our manuals! If we only could have got a day on Weebald Island, who can say what transgressions we might have found?

The inner and lower islands were less dramatic. Woody Island has some good sandstone ledges along shore; but Wood's Island, inhabited and severely burned, is botanically hopeless, and the other two visited were so slightly explored by us that we found nothing specially notable. The halophytic flora on the sandstone cliffs of Woody Island is particularly fine: all the ordinary halophytes of this region, with various doubtful Chenopods and Polygonums; *Euphrasia purpurea* Reeks amazingly fleshy or succulent; *Cochlearia cyclocarpa* Blake,[1] a biennial, with rosettes of rounded succulent leaves, tasting like a blend of water-cress and horseradish; and the broad-leaved *Plantago juncoides* var. *laurentiana* Fern.[2] in typical development. *Cornus suecica*, frequent enough along the coast and on the mountains, was here particularly beautiful; and the higher rocks supported good colonies of *Potentilla pectinata* Raf., a species known in Newfoundland from only a few stations, all on the West Coast.

The north-facing wall of the eastern serpentine half of Blomidon drips in many places with moisture from the packed snow and ice of its upper slopes; consequently its flora,[3] although limited in number of species, is a rich one for serpentine country (silicate of magnesium, therefore toxic to most plants); and, since the high ridge on the north side of North Arm is also serpentine, and very conspicuous from incoming and out-going boats, we had great hopes of some good things there. So, as a last trip, on a cold and windy day, Long and Fogg, with Pennell and one of the Sheppard boys, crossed in a motor boat to the North Arm. In our optimism we had overlooked one important point: the cold north side of Blomidon faces north and is bathed by melting snows through much of the summer; the hot serpentine slope north of the North Arm faces south and is arid and almost without vegetation. To Long and Fogg the arduous climb over

[1] Blake, RHODORA, xvi. 135 (1914).
[2] RHODORA, xxvii. 102, t. 150, fig. 5 (1925).
[3] See Fernald, RHODORA, xiii. 118, 132 (1911).

arid blocks of serpentine seemed to have few rewards, for nowhere did they find continuous carpets of vegetation, merely scattered plants of a few inconspicuous species. Nevertheless, they got several of the most localized and interesting species of the serpentines of western Newfoundland and thus added an intermediate station for them between Blomidon at the south and The Tableland of Bonne Bay at the north. *Adiantum pedatum* var. *aleuticum* Rupr. was there, of course, as on all the extensive serpentine areas of Newfoundland and Quebec, on the North Arm the most stiffly erect extreme. *Rhododendron lapponicum* was characteristic. In Newfoundland and Gaspé it grows profusely on serpentine barrens as well as on dry limestones; but in neither region have we ever found it on granite or quartzite, although further south, on Katahdin and on Washington, it is on reputedly granitic rock and it seems to be common on the granites and gneisses of Labrador. The failure in the best Rhododendron gardens to make *R. lapponicum* thrive might, perhaps, be averted by giving it a bed of broken serpentine or of magnesian limestone, rather than the usual peat and sand of conventional Rhododendron gardens.

Danthonia intermedia and *Conioselinum pumilum* Rose, in Newfoundland known only on serpentine, were brought back; and Long and Fogg had the two prostrate willows, already known from Blomidon, *Salix cordifolia* var. *Macounii* (Rydb.) Schneider and *S. anglorum* var. *kophophylla* Schneider. The junior member of the party, facetiously inclined to translate the technical names into the so-called "English names" of some of our handbooks, rendered the last "The Cough-loving Willow of the Angles" and suggested that we each carry a bit as a charm against colds. Three of the distinctive Caryophylls of Newfoundland or of Newfoundland and Gaspé were there, as on all the serpentine mountains yet explored in western Newfoundland: *Arenaria marcescens* Fern.,[1] *A. cylindrocarpa* Fern.[2] and *Cerastium terrae-novae* Fern. & Wieg.[3] All three are so interesting and so highly localized that it seems desirable to publish good illustrations of them. *Arenaria marcescens* (PLATE 255) forms broad mats on the driest of serpentine gravel in the Long Range of Newfoundland and on the great tableland of Mt. Albert in Gaspé. Related to various arctic and subarctic species (especially *A. laricifolia* L.

[1] RHODORA, xxi. 15 (1919).
[2] RHODORA, xvi. 43 (1914).
[3] Fern. & Wieg. RHODORA, xxii. 176 (1920).

and *A. arctica* Stev.), *A. marcescens* is nearer related to *A. obtusiloba* (Rydb.) Fern. (*Alsinopsis obtusiloba* Rydb.) of the Rocky Mountains.

Arenaria cylindrocarpa was long confused with the European *A. ciliata* L. and *A. norvegica* Gunn. (*A. ciliata* var. *norvegica* (Gunn.) Hartm., *A. ciliata* var. *humifusa* Hartm.). Several characters separate *A. cylindrocarpa* from both European species but Ostenfeld and some other European students have maintained that it is not specifically separable. Small but characteristic specimens of *A. cylindrocarpa* and of *A. norvegica* (*A. ciliata,* with strongly ciliate leaves, is more remote) are, therefore, shown (PLATE 256) with sufficient details to make their distinctness evident.

Cerastium terrae-novae (PLATE 257), known only from the western Newfoundland serpentines, is geographically very remote from its close relatives. In its large seeds it is somewhat like *C. Earlei* Rydb. of the Rocky Mts., but in the loose testa of the seed (very fragile and freely breaking away) it is nearer the European *C. latifolium* L. For purposes of illustration a very small plant has been selected; when well developed, *C. terrae-novae* may form fuscous-green or purplish mats up to 3 or 4 dm. across.

On this hopelessly barren ridge by the North Arm *Pinus Strobus* struggled against adversity, forming prostrate carpets 2 to 3 meters (6–10 feet) across and only 5–8 dm. (1½ to 2½ feet) high, but heavily loaded with cones, *P. Strobus* forma *prostrata* (Mast.) Fern. & Weatherby, RHODORA, xxxiv. 168 (1932), a far cry from the great White Pines of early New England days with trunks "seven feet eight inches in diameter" "and frequently 250 feet in height." In 1921 Mackenzie & Griscom found forma *prostrata* on Blomidon. Even the erect trees of *P. Strobus* in Newfoundland depart in some characters from the better developed trees on the continent, having very nodulose branchlets and short leaves, the latter not infrequently in 3's as well as in the conventional 5's. These modifications are apparently confined to the northeastern and rather unfavorable limits of the species.

The strong winds making it impossible to land on the outer islands or to reach Chimney Cove (Waghorne's station for *Erysimum coarctatum* Fern. and other very rare species) or Wild Cove, with "the beach . . . broken white coral" (*Nfd. and Lab. Pilot*), where Waghorne had found the North Pacific *Arenaria peploides,* var. *maxima* Fern. and the remarkable and never rediscovered *Salix*

Bebbiana, var. *projecta* (Fern.) Schneider, it was obvious that the Serpentine and the Lewis Hills were not to be reached this season. So, regretting to abandon them and to leave our hospitable home with the Sheppard family, we moved on to Port aux Basques, thence by the "Portia" to Burgeo.

Whereas Wisconsin glaciation in westernmost Newfoundland failed to denude the tablelands and often left the low forelands with their ancient blankets of deeply rotted rock, Burgeo and the region westward to the eastern base of the Long Range seems to have been scraped clean (PLATE 233). The granitic hills are quite denuded of rotted residual mantle, scratched and gouged as if heavy mattocks and picks had been used on them only yesterday, and littered with great unweathered and obviously transported boulders (PLATE 233). Here we got few of the localized endemics. The tiny *Betula Michauxii* Spach, Newfoundland and Labrador representative of the Old World *B. nana* L., but with unlobed bracts or scales, abounded, as it does in practically all acid peat on the Island; *Empetrum Eamesii* Fern. & Wieg., ROCKBERRY, with its beautiful coral-pink berries, likewise throughout the Island, was on all dry ledges, and the ubiquitous *Agrostis scabra* Willd. (*A. hyemalis* of most recent authors, not *Cornucopiae hyemalis* Walt.) was everywhere, but chiefly in the extreme with very large spikelets which occurs throughout Newfoundland (to be described in Part III). The dry peat of the granitic crests, just as at Port aux Basques and generally eastward to the Avalon Peninsula, was carpeted with *Festuca capillata* Lam., the typical European plant, here certainly indigenous. Damp mossy pockets were the home of the endemic of southern Newfoundland, *Epilobium Pylaieanum* Fern.[1] (PLATE 259), distinguished from the many forms of *E. palustre* by its very short oblong leaves, the oblong and round-tipped calyx-lobes and the unusually long beak of the seed. The original collections, from various stations from Cape Race to Cape Ray, were mostly unbranched, but at Burgeo and westward as far as we went (to the Great Barachois) it was often bushy-branched.

We spent one day between Burgeo and Sand Bank to the west, another about Great Barachois and following up Grandy Brook. In general, the flora was rather uninteresting, though the tedium was occasionally relieved by the finding of some species local on the Island:

[1] RHODORA, xxvii. 33 (1925).

Elatine minima (Nutt.) Fisch. & Meyer, either rare or generally overlooked; *Oryzopsis canadensis* (Poir.) Torr., which we had recently been collecting on Lark Mt.; *Carex hormathodes* Fern., already locally known in both western and eastern Newfoundland; and *Polygonum allocarpum* Blake,[1] for which the Newfoundland voucher had been unsatisfactory. The always surprising *Schizaea, Bartonia* and *Xyris* were there, as probably everywhere in southern Newfoundland; but when we finally had to leave for home we felt that we had done our duty by the severely glaciated granitic coast and that the next botanizing trip could rightfully be confined to the always repaying West Coast.

Planning for the next trip, in the summer of 1929, we laid out a very beautiful schedule which we hoped to carry through with aid I had received from the Milton Fund for Research at Harvard. Our optimistic programme closely followed, with amazing and unreasoning credulity, the announced sailings of the local steamers, especially the "Sagona," plying weekly (leaving Humbermouth on Wednesdays) between Bay of Islands and Battle Harbor (Labrador). We were to begin with a day or two at Old Port au Choix, near where Bachelot de la Pylaie, more than a century ago, had spent eight days, and close to Pointe Riche which Wiegand had visited in 1910; consequently, worked out. Wiegand, however, got a foliage-specimen of a very strange willow which Schneider and I had independently considered an undescribed species, but good material was needed. A day or two at Old Port au Choix would suffice; then a trip over to St. John's Island would give an opportunity to secure better material of a "red-seeded" *Taraxacum*, secured over-ripe in 1925. Then Trout River was in the schedule, with its spectacular mountains, and a long trip to the Lewis Hills, to be reached via Port au Port.

The railroad did its part and we kept up to schedule as far as Bay of Islands; but from the day of our arrival to the day of final sailing toward home in September the announced schedule remained abashed in the depth of a pocket-book and the only date actually kept was that of Fogg's departure some days before Long and I were ready to leave.

Reaching the Bay of Islands by train, exactly on schedule, near noon of Wednesday, July 10th, with abundant time to make the "Sagona" at 5 p. m., we learned, to our dismay, that, true to form, she was off

[1] Blake, Rhodora, xix. 234 (1917).

schedule. She had sailed late on the last trip north and "Heaven knew when she would be back." At last account she was taking on halibut on "the Labrador" and this was slow work, each dripping and slippery box weighing 200 lbs. and the contract calling for 1600 boxes to be aboard before she could start south! One commerical salesman of great experience advised us: "Next time wire to Battle Harbor and learn when she will sail south from there. When she has started south, you leave New York for Humbermouth and you will make her all right." No one knew when the "Sagona" would come in nor would they know until she had reached Rocky Harbor at Bonne Bay, only a few hours away. We were living at Davis's at Curling, our trunks and duffle bags were all at the steamship's terminal some miles away, at Humbermouth; but, by making several trips to the latter hotel-less point, we gradually lugged away much of our collecting material and settled down to work in the loft of the steamship company's wharf at Curling, where the agent, Mr. Frank Roach, did everything possible to facilitate our work and to keep us from regretting the loss of valuable time. It was actually a full week before the "Sagona" came in with her heavy cargo of once iced halibut, to be re-iced at Curling, shipped to North Sydney and there re-iced, thence going by train to Boston, New York, Buffalo and Detroit to supply the markets with "fresh" halibut. But our wait was a comparatively short one; a few miles away, as unconscious of our presence in the neighborhood as we of theirs, Mr. and Mrs. Frank Morris, the "Orchid enthusiasts," were spending 10 days at desolate "boom-town" Corner Brook, also awaiting the "Sagona!"

We were in perplexity. The shores of Bay of Islands had been "worked to death" and we dared not go beyond easy reach of the evasive "Sagona." The first afternoon we strolled, by way of much-botanized Mt. Moriah, along the railroad as far as Morley's Pond. The latter area had never been much visited; consequently, we were able to secure two species not previously known in the region: *Equisetum pratense*, abundant in the thicket, the first Newfoundland station south of St. John Bay; and *Potamogeton praelongus*, the abundant winter-buds of the preceding season swashing at the margin of the pond. We had gone especially to secure good material of *Najas flexilis*, seen by Wiegand and me in or near Morley's Pond in 1910, before our collecting equipment of that year had arrived, and left to be collected later. The wind was too strong for us to see it in

1929 and the vouchers still await collection. The springy thickets near the base of Mt. Moriah were white with "Mayflower," *Cardamine pratensis* var. *palustris* Wimm. & Grab., another addition to our list from Bay of Islands; and, in the pastured clearings about Curling and eastward to Crow's Gulch, the English Daisy, *Bellis perennis,* was an abundant weed, a plant frequent enough in gardens but never before in our experience a truly naturalized plant.

Looking from various points on Humber Arm one sees a conspicuous white hill a few miles up the Humber on the north side. I had often viewed it from a distance and had always mentally dismissed it as a badly burned granite or quartzite hill of no botanical interest. But, in desperation for something to occupy us, we decided to go there, for, at any rate, it would be wild and some miles from civilization, surely better than over-botanized Curling and shabby and hustling Corner Brook. So on July 12, Mr. Roach assuring us that the "Sagona" would not be in, he took us by motor boat up river to our hill, Hannah's Head according to established local nomenclature, but Mt. Patricia on modern English-made maps, imposing and rising perhaps 1200 feet above the river, one of the striking features of the famous Humber Gorge.

Landing on the wooded ledges, we at once saw the typical calciphiles of the region; Hannah's Head was limestone and sure to be interesting! The wooded glades were, of course, full of the ordinary plants of limy spruce woods; but, mingled with them here or in the springy openings on the opposite bank of the Humber (between Marble Mt. and Humbermouth), which we visited on two other days, and appearing quite native, were five European plants, two of which, in 1910, Wiegand and I had supposed to be introduced weeds. On the lower Humber, however, they are not aggressive and weedlike but occur with the strictly American and conservative plants of springy glades or openings; nor do they follow the railroad and mingle with the abundant introduced weeds a few miles away in the freight-yards of Humbermouth and Corner Brook. *Linum catharticum* abounds on the open springy banks and runs far up the slope of Hannah's Head in the limestone crevices; *Lathyrus pratensis,* superb in its woodland setting, with rich yellow flowers, extends high up a springy slope opposite Hannah's Head; *Cirsium palustre,* tall and unmistakable, with deep crimson-purple heads in dense glomerules, shares the swamps with the endemic American *C. muticum.*

Springy banks and margins of rills coming down the steep slopes on the south side of the river are bordered by a *Cardamine*, differing at once from the ubiquitous *C. pensylvanica* in its petiolulate rounded leaflets: *C. flexuosa* With., a beatiful European species new to North America. Along the river at the foot of Hannah's Head, on the ledges where we landed, the European *Scrophularia nodosa* L. grew from the crevices and, higher up, above the wooded base of the hill, it grew in many rock-crevices. This was good enough!

(*To be continued*)

ASTER PANICULATUS AND SOME OF ITS RELATIVES[1]

K. M. Wiegand

In a recent paper in this journal the writer[2] presented the results of some studies relating to *Aster lateriflorus* and its allies. The present paper is intended to record further studies of the white asters, particularly of those species centering around *A. paniculatus* Lam. In general this group differs from *A. lateriflorus* in the more paniculate, generally non-secund type of inflorescence, more scabrous-ciliate and more rigid rameal leaves, and the usually firmer leaves of the stem. One species of the previous paper, *A. ontarionis*, seems to lie between *A. lateriflorus* and the *A. paniculatus* group, since, as in the latter species, the heads are scarcely at all racemose while at the same time it has softer rameal leaves and deeper corolla-lobes, thus suggesting *A. lateriflorus*. Likewise, another species, *A. saxatilis*, lies somewhat between *A. paniculatus* and *A. vimineus*. *A. praealtus* of the group now under consideration often has distinctly racemose but not secund heads.

A. paniculatus and its relatives have given endless trouble to botanists. One has only to note the numerous names borne by specimens of the various species as they occur in herbaria. Dr. Gray was greatly troubled by them, and his opinion of the white asters was quoted in the previous paper.[3] In that paper the writer took the view that a major difficulty with the group has been the failure to recognize

[1] Published with aid of a grant to Rhodora from the National Academy of Sciences.

[2] Rhodora xxx. 161 (1928).

[3] See also: Proc. Amer. Acad. xvii. 163 (1882).

hybridity as an important element in the confusion. The present studies have tended greatly to strengthen the view that hybridization takes place frequently in the wild between many species of Asters, especially in the group under study; and that most herbaria contain an undue number of such specimens because collectors very generally gather only aberrant forms of these common species. Plants interpreted as hybrids of *A. paniculatus* with *A. lateriflorus, A. vimineus, A. dumosus, A. missouriensis, A. puniceus, A. novi-belgii, A. cordifolius, A. ericoides, A. undulatus, A. laevis*, and *A. praealtus* have been seen. Of these, hybrids with *A. puniceus* and *A. lateriflorus* are much the most common. When these hybrids are eliminated, the remaining specimens fall into natural groups. Some of these groups are distinct and should therefore be regarded as species, while others grade into one another and are of the category of varieties. Another factor which makes the delimitation of groups difficult, even when the hybrids are removed, is the plastic nature of some of the species with regard to the environment. Changes in soil, shading, crowding, and other conditions, often give rise to individuals of quite unique appearance. Field studies have furnished at least a partial understanding of the limits of environmental influence.

The recognition of hybrid plants in the herbarium is not always easy. If they could be grown and bred in the garden, their parentage could often be determined, and with comparative ease. Fortunately, however, the parentage does stand out clearly on some specimens. Hybrid Asters are rarely exactly intermediate in all their characters. Individual characters, however, are sometimes intermediate though rarely exactly so. More often it would seem that these characters do not blend but behave as units somewhat in Mendelian fashion, being either present or absent as dominance or pure blood dictates, the hybrids recombining in various ways the characters of the two parents. In some hybrid specimens the characters are nearly all of one parent so that only the trained specialist in the group will detect the slight evidence of the inheritance of some one or two characters from the other parent. Continued reviewing of the material is often necessary before all the hybrid specimens in a collection are rightly placed. The work of A. S. Pease[1] on *A. tardiflorus* is a good example of the detail to be considered in each case, though now we know that in addition to the characters used by him, venation and the details of

[1] Rhodora xix. 98 (1917).

floret-structure must be given careful consideration. Sometimes, however, two different sets of parents may, by the combination of their characters, give so nearly the same appearance in the offspring, that it is not possible to decide which were the true parents. There is abundant opportunity for error in the determination of the parents of hybrid herbarium specimens even with the most painstaking effort. Accurate identification of the parents of hybrid Asters can be made only when accompanied by careful field and genetical studies.

In identifying hybrids of *A. paniculatus* and *A. puniceus* attention must be given to the color of stem, type of cauline hairs, length of internodes, type of branching, shape of leaf-base, character of teeth, prominence of the finer reticulum, rugose upper surface of leaf, degree of scabrosity, type and size of rameal leaves, size of heads, character of involucre as to width, texture and degree of divergence of bracts, color and length of rays, and size of the lobes of the disk-corolla. In the case of crosses between *A. paniculatus* and *A. lateriflorus*, the type of cauline pubescence, leaf-base and leaf-shape, scabrosity, hairiness of midrib, type of branching of the plant, racemose heads, size of heads, type of involucre, number and length of rays, and length of lobes of disk corolla are of importance. Nomenclature in this group of Asters is in a very unsatisfactory state. It is not unusual in herbaria to find specimens of a single form bearing as many as five different names. Some of this confusion is due to synonomy, and some to a poor understanding of the taxonomy of the group. Even the monographer, however, is in difficulty. Many names proposed by Lamarck, Aiton, Willdenow, Nees von Esenbeck, and others, were based largely on plants long under cultivation in European gardens. Exact records of the origin of this cultivated material were for the most part lost, and the plants themselves seem to have changed in character through variation or hybridity during their long period of cultivation so as to be no longer identifiable with any form in the wild state.[1] It seems necessary, therefore, to ignore many of these old names as unidentifiable. Specimens grown in European gardens under some of the names proposed by these authors were obtained by Dr. Gray many years ago, some of them collected even as early as 1820 or 1830, but for the most part they are unlike any strains now known in America. The writer has had little opportunity to study types abroad, and the nomenclature here used must be considered as

[1] See Gray: Proc. Amer. Acad. xvii. 163 (1882).

in some cases provisional. The interpretation of Dr. Gray, who saw some of the types, has been given weight wherever possible.

The study of this group of Asters as it occurs in the far west has not been as thorough, and the material seen has not been as complete as in the case of the eastern forms. In general, the present group is distinguished in the west from other species which may resemble it by the pubescent lines on the stems and branches, and generally paniculate habit.

The material forming the basis of this study is that in the Gray Herbarium and the herbarium of Cornell University. A part of the material in the New England Botanical Club herbarium has also been studied, and the material in the herbarium of the New York Botanical Garden and the Philadelphia Academy of Natural Sciences has been superficially examined. About 1300 measurements were made of involucre, ray-flowers, disk-flowers and other organs. It was found in the course of this work, as in the study of *A. lateriflorus*, that many of these measurements are of material aid in delineating groups, and especially in detecting hybrids. They are useful also in the determination of the parents of these crosses. The abundant overlapping of the measurements within such groups as *A. paniculatus* and *A. praealtus* has greatly strengthened the opinion that the varieties of these species treated below are really varieties and not species.

Key to the Species and Varieties Studied

a. Veinlets forming a conspicuous reticulum of fine nearly isodiametric areolae; lateral primary veins usually wanting: leaves subcoriaceous, with slightly revolute margins; rameal leaves spreading in most varieties: involucral bracts firm at base, often with loose spreading tips: spread of rays (15) 18–27 mm.: lobes of disk-corollas short, 17 to 25 per cent of the whole length of the limb.[1] . . . . *b.*

b. Involucral bracts little imbricated, the tips commonly not plainly deltoid. . . . . *c.*

c. Leaves glabrous beneath, glabrous or scabrous-puberulent above. . . . . *d.*

d. Rameal leaves linear or linear-lanceolate or narrowly elliptic-lanceolate, very acute. . . . . *e.*

e. Cauline and rameal leaves lanceolate to narrowly elliptic-lanceolate, the primary rameal about 6–10 times as long as broad. . . . . 1. *A. praealtus.*

e. Cauline and rameal leaves linear or nearly so, the primary rameal about 11 times as long as broad. Var. *angustior.*

[1] The disk-corollas consist of tube and limb. The latter is composed of throat and lobes.

d. Rameal leaves, at least the ultimate, broadly elliptic-lanceolate or oval, often obtuse.................Var. *subasper.*

c. Leaves puberulent or scabrous on both surfaces: stems more puberulent...............................Var. *nebraskensis.*

b. Involucral bracts conspicuously imbricated in 3 to 6 series of different lengths.....*f.*

f. Heads not racemose, rather scattered: rameal leaves linear-lanceolate, divaricate: involucral bracts in 3–4 series...Var. *texicola.*

f. Heads more crowded, usually more or less racemose on the branches: rameal leaves short, about 1 cm. long, linear-oblong, crowded, more ascending: involucral bracts in 4–6 series............................Var. *imbricatior.*

a. Veinlets not so evident or, if evident, with more irregular and more oblong areolae: leaves more succulent or membranous; the rameal usually flat, ascending or spreading: involucral bracts scarcely firm, sometimes thick, usually membranous, the tips rarely spreading.....*g.*

g. Plant paniculate, often bushy, up to 2 m. high: involucre of rather narrow and thin or succulent bracts: upper leaves little or much reduced; cauline leaves scarcely or but slightly clasping, the midrib single or nearly so (see no. 2).....*h.*

h. Heads of medium size: involucre (4) 4.5–8 mm. high: spread of rays 12–25 mm.....*i.*

i. Corolla-lobes 19 to 36 per cent. of whole length of limb: involucral bracts subequal and the outer often herbaceous and loose or spreading, rarely much imbricated: leaves rather firm, at least the upper not narrowed at base: veins, except midrib, obscure.....*j.*

j. Plant bushy, paniculate: heads numerous: involucre 5.5–7.5 mm. high: ray-corollas 8–12 mm. long: leaves linear or narrowly lanceolate; the rameal much reduced, scarcely or but slightly clasping.................2. *A. coerulescens*

j. Plant less bushy and more corymbose-paniculate: heads somewhat larger and fuller: involucre 7–8 mm. high: ray-corollas 13–16 mm. long: leaves slightly broader; the rameal little reduced, more clasping.............Var. *Wootonii.*

i. Corolla-lobes 30 to 45 per cent. of the length of the limb: involucral bracts unequal and imbricated: leaves less firm and often more veiny, nearly all narrowed at base.....*k.*

k. Leaves linear or nearly so, 12 times as long as broad or longer.......................3. *A. paniculatus.*

k. Leaves lanceolate, less than 12 times as long as broad.................................Var. *simplex.*

h. Heads smaller: involucre 3.3–4.5 mm. high (rarely 5 mm. in no. 4): spread of rays 10–16 mm.: lobes of disk-corollas 30 to 45 per cent. of length of limb.....*l.*

l. Heads loosely paniculate, rather few: rameal leaves soft, scarcely sharp-pointed: plant small for the group, 1.5–6 dm. high: leaves 3–10 cm. long, rather soft. usually entire: northeastern.................................4. *A. saxatilis.*

l. Heads subracemose on the branches, very numerous on well developed plants: rameal leaves very numerous, rather firm and sharp-pointed: plant coarser, up to 1.5 m. high: leaves firmer, often 15 cm. long, often serrate: central-western. . . . . 5. *A. interior*.

g. Plant with a rather small subcorymbose panicle, rarely over 8 dm. high: involucre of firmer and often broader, more imbricated bracts often with pale midribs: upper leaves little reduced, generally clasping; cauline leaves rather thick, slightly clasping, pale, often with whitish veins, midrib usually doubly or triply nerved: corolla-lobes 18 to 28 per cent. of length of limb. . . . . 6. *A. laetevirens*.

1. A. PRAEALTUS Poir. Encyc. Suppl. i. 493 (1810). *A. salicifolius* Ait. Hort. Kew iii. 203 (1789) not Lam.?; Gray Synopt. Fl. N. A. 1^2. 188 (1884) and Rob. & Fern. in Gray, Man. ed. 7: 812 (1908), in part the vars.; Britton & Brown Ill. Fl. N. S. and Can. iii. 377 (1898), in part. *A. rigidulus* Desf. Cat. 122 (1815). *A. obliquus* Nees, Gen. et Sp. Aster, 76 (1833). *A. carneus* T. & G. Fl. N. A. ii. 133 (1841), in part at least; Gray, Man. eds. 1 to 5 but doubtfully Nees, Synop. Ast. 27 (1818) and Gen. et Sp. Ast. 96 (1833). *A. hesperius* Gray, Synopt. Fl. 1^2. 192 (1884), in small part.—Stems 4–18 dm. high, rarely higher, glabrous below, pubescent in lines above, or the pubescence almost completely encircling the stem, often brownish or purplish, densely and paniculately branched in the upper part; branches ascending or spreading, very leafy: leaves subcoriaceous, slightly revolute, glossy, smooth, scabrous or scabrous-puberulent above and usually rugose, glabrous beneath; margins entire, scabrous; veinlets conspicuously reticulated especially beneath; primary veins from the simple midrib not evident except in the largest leaves; areolae of the reticulum as wide as long; cauline leaves lanceolate or elliptic-lanceolate, very acute, mostly 7–13 cm. long and 8–18 mm. wide; primary rameal leaves narrowly lanceolate, very acute, 2–4.5 (6) cm. long, 6 to 10 times as long as wide; ultimate rameal leaves similar but smaller: heads of medium size (disk 6–10 mm. broad), numerous, racemose toward ends of branches, forming a large broad panicle; the short peduncles irregularly foliose-bracted: involucre 5–7 mm. high; bracts firm, in 3–4 successively shorter series, none normally foliaceous but sometimes with loose tips, oblong-lanceolate or linear-lanceolate, 0.6–1 mm. wide, very acute, glabrous or sparingly erose-ciliate, pale at margin and base, the slender green midrib narrowly rhombic-dilated above: rays 20–35; the corollas 6–15 mm. long, 0.8–1.6 mm. wide, bluish-purple, rarely white: disk-corollas narrowly funnel-form or tubular; the erect or ascending lobes very short (0.5–0.9 mm. long), only 17 to 25 per cent of the length of the whole limb: pappus-hairs 40–60, each 4.5–7 mm. long: achenes about 2 mm. long, more or less hairy.—Low ground: Kentucky, Ohio and Michigan to Wisconsin (?), Kansas, Arkansas, Texas, New Mexico, Arizona and northern Mexico;

apparently fairly common in Illinois and adjacent states. Some specimens examined: Kentucky: *Short* (2 specimens). Ohio: *Riddell*, also *Sullivant* (T. & G. specimens). Michigan: Detroit, 1900, *O. A. Farwell*, no. 871. Indiana: Wells County, 1913, *C. C. Deam*, no. 14145. Illinois: *J. Wolf*, nos. 175, 188, 189, also *E. Hall;* Carlinville, 1890, *W. E. Andrews*, no. 16; Ringwood, 1862, *Vasey;* Sidney, 1914, *A. S. Pease*, no. 16335; Larchmound, 1914, *R. Ridgway*, no. 69; Fountaindale, 1872, *M. S. Bebb;* Peoria, 1904, 1906, *F. E. McDonald*. Iowa: Ames, 1877, *J. C. Arthur*. Missouri: St. Louis, 1832, *Drummond;* Dodson, 1906, *B. F. Bush*, no. 4151; Jackson County, 1893, *Bush*, no. 159. Arkansas: *F. L. Harvey*, no. 29. Kansas: Atchison County, 1895, *A. S. Hitchcock*, no. 989. Oklahoma: Tulsa, 1913, *G. W. Stevens*, no. 2977; Fisher, 1913, *Stevens*, no. 2966. Texas: Dallas, 1874, *J. Reverchon;* Fredericksburg, 1850, *G. Thurber*, no. 61. Mexico: near Chihuahua, 1885, *C. G. Pringle*, no. 288 in part, but involucre peculiar. New Mexico ? 1851, *C. Wright*. Arizona: near Ft. Huachuca, 1882, *Lemmon*, no. 2906 (not quite typical, labelled "*Aster hesperius* n. sp." by Gray); Wilgus Ranch, Chiricahua Mts., 1907, *J. C. Blumer*, no. 1774; Barbacamori, 1851, *C. Wright*, no. 1159 (possibly a hybrid; labelled "*A hesperius* n. sp." by Gray). One specimen is from Stony Brook, Jamaica Plain, Massachusetts (1887, *E. & C. E. Faxon*, no. 21), but this may have been introduced there, as also may have been specimens labelled "Georgia, *P. V. LeRoy*" and "Byram, N. J., *H. L. Fisher*."

The name adopted for this species by Torrey & Gray was *A. carneus* Nees. This name was used in the various editions of Gray's Manual up to and including the fifth, and was the one employed in Wood's Class-Book of Botany. In the Synoptical Flora, Dr. Gray substituted the name *A. salicifolius* Ait. (Lam.?) since which time this has been the accepted name. Lamarck's *A. salicifolius* is, however, practically unidentifiable. Dr. Gray in his studies of types abroad found no specimen so named by Lamarck and Prof. Lecomte has stated to the writer that apparently no type specimen exists in the Lamarck herbarium. The original description does not strongly suggest the present species. The leaves are described as "serrates,—glabres et bordes de dents aigues un peu distants," while those of the species in question are entire or nearly so. It would seem desirable to drop the Lamarckian name as impossible of definition. In 1789 Aiton proposed an *A. salicifolius* independently. An excellent photograph of the type specimen in this case has been kindly supplied the writer by Mr. Ramsbottom and it is clearly a photograph of the present species, an interpretation supported by a few florets from the type which show the short corolla-lobes and long throat characteristic of this species.

The International Congress at Cambridge in 1930 voted to reject homonyms with the sentiment in favor of such rejection even if the first used name is simply undefinable. It would seem best therefore to give up the name *A. salicifolius* entirely.

In 1810 Poiret proposed the name *A. praealtus*, basing it entirely on Aiton's *A. salicifolius*, it being essentially a renaming of that species. This name therefore is referable unquestionably to our plant. However, several names were proposed before Poiret's for plants of this general group of Asters. A study of these names seems to indicate that none clearly apply to the present species. These names doubtfully relating to it may be briefly discussed: *A. salignus* Willd. (Sp. Pl. iii. 2040, 1804), as now occurring in Europe, resembles *A. praealtus* superficially and has short corolla-lobes, but it has larger heads, looser involucre, subdentate leaves, and much coarser vein-reticulations. In general character the leaves are more like those of the *A. puniceus* group. *A. bellidiflorus* Willd. (Enum. Hort. Berol. 886, 1809) has been generally referred to *A. paniculatus*, but some of the old European garden specimens in the Gray Herbarium are nearly *A. praealtus*. The mention of subclasping leaves and loose involucre suggests *A. salignus*, from which Nees says Willdenow differentiated it, or *A. puniceus*, and not *A. paniculatus* (rays white) nor scarcely *A. praealtus*. It was very likely a garden hybrid. *A. eminens* Willd. (Enum. Hort. Berol. 886, 1809) was referred by Dr. Gray in his study of types to *A. salicifolius* and in the Synoptical Flora to *A. salicifolius* or *A. paniculatus*. Nees, however, made it a synonym of *A. junceus* Ait. and *A. longifolius* Lam. In the original description the involucre is described as loose, which would scarcely apply to *A. salicifolius* or *A. paniculatus* but the height given is five feet which is scarcely if ever attained by *A. junceus* or *A. longifolius*. The subserrate leaves and 1-flowered branches are not characters of *A. salicifolius*. This plant also was most probably a garden hybrid.

In recent years there has been great confusion in the application of the name *A. salicifolius* (*praealtus*) to herbarium specimens, and the extension of the range to the east by many authors has been largely based on specimens of *A. paniculatus* var. *simplex* incorrectly named. *A. praealtus* may be readily distinguished from *A. paniculatus*, however, by the shallow corolla-lobes and thicker more noticeably and more finely reticulated leaves.

Just how *A. praealtus* came into European gardens so early (1760

by P. Miller according to Aiton, probably earlier) is not clear. No form of this species grows near the Atlantic seaboard except in the Boston and New Orleans regions. The European specimens do not greatly resemble the var. *angustior*, the only form that occurs near Boston. French missionaries, however, may have brought back plants from the interior.

Var. **angustior**, var. nov., foliis longioribus et angustioribus, linearibus vel lineari-lanceolatis, 11-plo longioribus quam latis.

Leaves longer and narrower than in the typical form of the species, linear or linear-lanceolate, about 11 times as long as broad, the long narrow usually spreading rameal leaves particularly striking: involcure and pappus tending to be shorter than in the typical form of the species.—Rich low open woods or banks: "Oak Island," Revere Beach, near Boston, Massachusetts; also Indiana and Illinois. Specimens examined: Massachusetts: "Chelsea Beach Island" [Oak Island], 1850, *W. Boott* (type in Gray Herb.); Oak Island, Revere, 1878, *H. A. Young*, 1883, *E. Faxon*, 1894, *G. G. Kennedy*. Indiana: Mt. Vernon, Posey Co., 1920, *C. C. Deam*, no. 33,064. Illinois: Fountaindale, 1872, *M. S. Bebb.*

The distribution of this plant is interesting. It is another western plant finding an isolated eastern station on Oak Island,[1] Revere Beach, along with *Eupatorium falcatum* Michx. and several others.

Lindley's *A. stenophyllus*[2] was referred to this species by Dr. Gray, and accepted by Burgess[3] (as a variety) for narrow-leaved forms. There is much doubt as to whether Lindley had any form of *A. praealtus* in mind. His description calls for a plant with spreading branches densely racemose at apex, secund heads, inner involucral bracts with colored tips and rays pale flesh-colored. It is placed in a group with *A. hirsuticaulis* Lindl., *A. diffusus* Ait., *A. miser* L., and *A. pendulus* Ait., and very likely belonged to the *A. lateriflorus* group. Burgess also apparently had some other plant in mind, as the range given by him was much to the southward. It seems scarcely wise therefore to employ the name, var. *stenophyllus*, for the present variety.

Var. **subasper** (Lindley), comb. nov. *A. subasper* Lindl. in Hooker's Comp. Bot. Mag. i. 97 (1835), also in DC. Prod. v. 237 (1836). *A. carneus β. subasper* T. & G. Fl. N. A. ii. 133 (1841), in part. *A. salicifolius* var. *subasper* A. Gray, Synopt. Fl. i.[2] 188 (1884) and Robinson & Fernald in Gray, Man. ed. 7, in large part.—Leaves generally more scabrous than in the typical form; rameal leaves, or at least the ulti-

[1] For an account of Oak Island see W. P. Rich, "Oak Island and its Flora." Rhodora iv. 87 (1902).

[2] In DC. Prodr. v. 242 (1836).

[3] In Britton & Brown, Ill. Fl. N. S. and Can. iii. 377 (1898).

mate, broad, only 2–5 times as long as wide, merely acutish, with often truncate or somewhat clasping base: bracts of the involucre generally broader, (0.8) 1–1.5 mm. wide.—Illinois and Texas. "Foliage not shining, grows in very low ground in dense clusters, . . . bogs" (*J. Wolf*). Specimens examined: INDIANA: *Dr. Clapp.* ILLINOIS: Canton, 1881?, *J. Wolf*, nos. 205 and 110, 1893 *Wolf*, nos. 26 and 32; Carlinville, 1892, *W. E. Andrews*, no. 9a. TEXAS: "4–6 feet high, branching above in large dense patches, on swampy places of the mountain streamlets, on the Liano," 1845–48, *F. Lindheimer*, nos. 456, 625 and b254.

Lindley's *A. subasper* seems to have been based on the scabrous character, but Dr. Gray mentions also the broader rameal leaves and involucral bracts. These two latter characters seem more important and more constant than the degree of roughness. More emphasis placed on the breadth of bract has resulted in the transfer of a few specimens labelled "var. *subasper*" by Gray to the typical form.

Var. **nebraskensis** (Britton), comb. nov. *A. nebraskensis* Britton in Britton & Brown's Ill. Fl. N. S. & Can. iii. 375 (1898).—Stem more pubescent: leaves scabrous or puberulent on both surfaces, averaging broader: heads rather large: involucral bracts strongly ciliate, often puberulent, usually broader.—Nebraska. Specimens examined: NEBRASKA: "Valley of the Lower Platte," 1842, *Fremont Exped:* Burwell, 1907, *J. M. Bates;* Ainsworth, 1897, *Bates;* Callaway, 1900, *Bates*, no. 2603; Whitman, 1893, *P. A. Rydberg*, no. 1724, duplicate type.

The taxonomic status of this variety is not very clear. The Rydberg specimen has very broad rameal leaves and rather broad bracts as in var. *subasper,* while the leaves and involucral bracts of the other specimens approach those of typical *A. praealtus.* The foliage seems a little coarser than in *A. praealtus.* The involucral bracts are apparently a little less unequal, and possibly in fewer series, than in the typical form and var. *subasper.*

Var. **texicola**, var. nov. Bracteis involucri vere imbricatis exterioribus seriatim brevioribus, capitulis non racemosis laxis submagnis, foliis ramorum lineari-lanceolatis divaricatis laxis.

Similar in habit and foliage to the typical form but more open and diffuse: rameal leaves rather short, linear-lanceolate, spreading, not crowded: heads slightly larger and more loosely arranged, less racemose: involucral bracts more imbricated, in 3–4 successively shorter series, rather broad (about 1 mm.), with subdeltoid tips, broadly green with narrow or obsolete scarious margins.—Kansas and Texas. Specimens examined: KANSAS: Univ. Campus, Lawrence, 1902, *M. A. Barber*, apparently this. TEXAS: "Under shrubs on the rocky banks of the upper Pierdenales" [Pedernales River, Gillespie Co?] 1845, *F. Lind-*

heimer, no. 445; "3–5 ft. high, banks of streams," Comanche Spring, 1849, *Lindheimer*, nos. 186b, and 881 (TYPE in Gray Herb.); Dallas, 1880, *J. Reverchon*, no. 40.

The heads in this variety are larger than in any other form of the species except possibly var. *nebraskensis*.

Var. **imbricatior**, var. nov. Bracteis involucri valde imbricatis latis exterioribus seriatim brevioribus, capitulis plus minusve confertis racemosisque, foliis ramorum 1 cm. longis sublatis confertis.

Involucre more obconic than in the last variety; bracts much imbricated in 4–6 successively shorter series, passing into the rameal leaves: heads more racemose and more crowded: rameal leaves about 1 cm. long, rather broad, crowded.—Missouri to Texas. Specimens examined: MISSOURI: near Springfield, 1890, *S. Weller*. ARKANSAS: *Dr. Woodhouse*. TEXAS: New Braunfels, 1851, *F. Lindheimer*, nos. 636 and 883; College Station, 1896, *H. Ness*. (TYPE in Herb. Cornell Univ.)

This variety has the appearance of a hybrid of *A. praealtus* and *A. lateriflorus* var. *pendulus*, but the specimens are rather uniform and extreme. The var. *pendulus* is apparently rare in Texas. It probably occurs in the eastern part of the state, but the writer has seen no certain specimens from there.

2. A. COERULESCENS DC. Prod. v. 235 (1836). *A. salicifolius* var. *caerulescens* Gray, Synopt. Fl. N. A. i² 188 (1884), in part at least. *A. hesperius* Gray, l. c. 192 (1884), in large part. *A. fluvialis* Osterhout, Bull. Torr. Bot. Club. xxxii. 611 (1905). *A. fluviatilis* Rydb. Fl. Rocky Mts. 886 (1922). *A. lautus* Lunell, Amer. Mid. Nat. ii. 146 (1911). *A. durus* Lunell, l. c. ii. 148 (1911). *A. lautus* var. *prinoides* Lunell, l. c. v. 55 (1917). *A. paniculatus* var. *polychrous* Lunell, l. c. v. 55 (1917).—Stem tall, up to 1.5 m. high, much branched above in the larger plants and bushy, glabrous below, more or less striate or angled and pubescent in lines above; branches ascending or spreading: leaves linear or narrowly lanceolate, thick and obscurely veined, 6–15 cm. long, 5–15 mm. broad, very acute, tapering to a scarcely auriculate base, glabrous and smooth or sparingly scabrous above, scarcely rugose, glabrous beneath; margin entire or with a few low teeth, scabrous; midrib pale, sometimes accompanied by two indistinct parallel adjacent more slender veins, and often with a few strongly ascending branches; areolae irregular, inconspicuous, mostly longer than broad; rameal leaves much smaller, narrowly lanceolate, ascending, slightly if at all clasping, scabrous margined, often falcate on the more diffusely branched plants: heads numerous, in a large panicle, rarely at all racemose, mostly short peduncled and rather crowded: involucre 5.5–7.5 mm. high; bracts rather thin, narrow, lanceolate or linear-lanceolate, 0.7–1.0 mm. broad, gradually acute, in 2–4 nearly equal series, or the outer sometimse shorter and more

imbricated, usually somewhat foliaceous and loose and often with slightly spreading tips, more or less ciliate-erose, otherwise usually glabrous; margins and base of the inner bracts mostly pale, the fine green midrib gradually dilated above: rays 23–34, rarely more, white or purple; the corollas rather long, (8) 10–12 mm. in length, 0.8–1.5 mm. broad: disk corollas narrowly funnelform or tubular; the erect or ascending short lobes 0.6–1.1 mm. long, 19–36 per cent of the length of the whole limb: pappus hairs 45–60, each 5–6 mm. long: achenes about 2 mm. long, hairy.—Damp soil along rivers and irrigation ditches: Wisconsin and Alberta to Central Nebraska and Wyoming (Nelson), southward through central Kansas and the mountain foothills to central Texas, northern Mexico, Arizona, Utah and southern California. Some specimens examined: ALBERTA: 1906, *Macoun.* WISCONSIN: St. Croix Falls, *C. F. Baker* (probably this). NORTH DAKOTA: Leeds, 1910–16, *J. Lunell,* nos. 1085, 1086, 1087, 1091. NEBRASKA: Long Pine, 1896, *J. M. Bates;* Red Cloud, 1909, *Bates;* Wood River, 1910, *Bates.* KANSAS: Riley County, 1895, *A. S. Hitchcock,* no. 726. OKLAHOMA: Tishomingo, 1915, *H. W. Houghton,* as Stevens no. 3508. COLORADO: Platte River, 1910, *A. Eastwood,* no. 74; New Windsor, 1897–98, *G. E. Osterhout,* no. 8, 1899, *Osterhout,* no. 4, 5 & 7, 1905, *Osterhout,* no. 3188. TEXAS: *Berlandier,* no. 510 (duplicate type of DC.); Weatherford, 1902, *S. M. Tracy,* no. 8133. UTAH: Hurricane, 1918, *W. W. Eggleston,* no. 14840. ARIZONA: near Ft. Huachuca, 1882, *Lemmon,* no. 2905; Black River Flats, *J. T. Rothrock,* no. 789, not typical. CHIHUAHUA: Colonia Garcia, 1899, *Townsend & Barber,* no. 346, probably, undeveloped. CALIFORNIA: San Diego County, 1874, *D. Cleveland;* San Bernardino Valley, *S. B. Parish,* nos. 564, 572, 3818; San Jacinto Mts., 1880, *Parish Brothers,* no. 526; Ft. Tejon, 1864, *Dr. Horn;* Walker's Basin, Kern County, 1875, *J. T. Rothrock,* no. 283; Tehachapi, Kern County, *Brandegee.*

The oldest name for this plant is apparently *A. coerulescens* DC. A duplicate of the type is in the Gray Herbarium and belongs clearly to the present species, not to *A. salicifolius* as stated by Dr. Gray. Judging from specimens labelled by Dr. Gray, his *A. salicifolius* var. *caerulescens* was a mixture of several forms, and apparently was not well understood. Two of these specimens are here referred to *A. praealtus* var. *texicola,* one is related to *A. ericoides,* and two others belong to the present species, one of these being the duplicate type. Specimens labelled "*A. hesperius* n. sp." by Gray indicate that this latter species was based partly on *A. praealtus* and partly on specimens of *A. coerulescens.* The specimens cited from North Dakota in the present paper are all type specimens of the various Lunell synonyms listed above, and are all in the herbarium of the University of Minnesota. They are not unlike the general run of specimens of this species.

Var. **Wootonii** (Greene), comb. nov. *A. hesperius* var. *Wootonii* Greene, Bull. Tor. Bot. Club. xxv. 119 (1898). *A. Wootonii* Greene, Leaflets, i. 146 (1905).—Heads rather large, the involucre 7–8 mm. high, and ray corollas up to 16 mm. long: inflorescence a little more corymbose: stems less branched: rameal leaves much less reduced, broader and more clasping at base.—"Wet ground especially along streams in the Transition Zone" (Wooton & Standley): mountains of New Mexico and Arizona and possibly southern California. Specimens examined: New Mexico: *Rose & Fitch*, no. 15780; Mogollon Mts., 1881, *H. H. Rusby*, 191; White Mts., 1897, *E. O. Wooton*, no. 329 (duplicate of type of var. *Wootonii* Greene). California: Tehachapi, *Mrs. Brandegee*, probably this; San Antonio Mts., 1917, *I. M. Johnston*, no. 1427, not typical; San Bernardino Mts., 1884, *S. B. Parish*, no. 1691, probably.

The status of this variety is not clear. In the present study insufficient material was at hand to give a clear picture. Its aspect sometimes approaches that of *A. laetevirens*, but the involucre is like that of *A. coerulescens*. The southwestern forms of *A. praealtus* seem to have been mistaken for this variety at times. It probably occurs in southern California, but the specimens seen from that region are transitional to the typical form. Rydberg[1] has noted that Wooton's no. 329, which represents the type collection of var. *Wootonii* Greene, and Baker's no. 817, cited by Greene as typical of his *A. Wootonii*, are not the same. Duplicates of these numbers seen by the writer indicate that they are not. Wooton's specimen is an immature rather untypical plant apparently of this variety, while Baker's specimen seems to be a diffuse form of *A. laetevirens*.

3. A. paniculatus Lam. Encyc. i. 306 (1783); Gray, Synopt. Fl. N. A. i^2. 187 (1884) in part; Gray, Man. ed. 6 and 7, in large part. *A. tenuifolius* T. & G. Fl. N. A. ii. 132 (1841), in part at least, not L., and Gray, Man. eds. 1–5. *A. tenuifolius β ramosissimus* T. & G. l. c. (1841), the more divaricate-branched plants. *A. tenuifolius γ bellidiflorus* T. & G. l. c., the more strict plants chiefly, doubtfully *A. bellidiflorus* Willd. Including *A. paniculatus* var. *bellidiflorus* Burgess in Britton & Brown, Ill. Fl. No. Sta. and Can. iii. 377 (1898) and Gray, Man. ed. 7, largely, except perhaps as to range.—Stems 5–15 dm. high, rather strict or sometimes diffuse, glabrous below, pubescent in lines above and usually with greenish striae; branches ascending or sometimes widely spreading: middle cauline leaves narrow, linear or nearly so, 8–15 cm. long, 3–12 mm. wide, 12 times as long as broad or narrower, mostly spreading, tapering to an acute apex and non-clasping base, rather firm but not coriaceous, glabrous and smooth on both surfaces or scabrous above toward the tip, not at all rugose;

[1] Bull. Torr. Bot. Club xxxvii. 140 (1910).

margins usually flat, scabrous-ciliolate, more or less serrate in the larger leaves, rarely entire; primary branch-veins few, not conspicuous, the ultimate areoles irregular, mostly longer than broad, usually indistinct; rameal leaves lanceolate to nearly subulate, ascending or more rarely spreading, rather stiff, their margins scabrous-ciliolate: heads of medium size (disk 6–8 mm. broad), paniculate, rarely at all racemose and then not unilaterally disposed; involucre (4) 4.5–5.5 mm. high; bracts narrow, linear-subulate, linear, or narrowly oblong, acutish, glabrous or sparingly ciliolate, rather firm but not coriaceous with green midrib and apex, well imbricated, usually even the tips appressed: ray corollas 20–40, each 6 to 11 mm. long, white, very rarely tinged with blue or lavender: disk corollas narrowly funnelform or tubular; lobes moderately deep, 0.7–0.9 (1.2) mm. long, 30 to 45 per cent of the length of the whole limb, usually spreading, rarely at all recurved: pappus hairs (32) 40–65 (80), each 3.6–6 mm. long: achenes narrowly obovoid, somewhat flattened, strigose, about 2 mm. long.—Meadows, low thickets and shores: New Brunswick, Nova Scotia, Maine, and central Quebec to Connecticut and the highlands of New Jersey and eastern Pennsylvania, westward through Ontario and Ohio to Wisconsin and Missouri; common in Canada and northern New England, frequent in northern New York but rare elsewhere in the state, rare in northern Ohio and northern Illinois. A strict specimen from Missouri (Courtney, *Bush*, no. 1785) is apparently to be referred to this form of the species. The habit varies greatly. Forms with strict branches and rameal leaves have been segregated as var. *bellidiflorus,* and were so segregated in the present study during its earlier stages. A closer inspection, and a tabulation of the flowering period as determined from the labels, has seemed to show, however, that these strict plants are for the most part juvenile stages of the more divaricate and diffuse types. It may be noted incidentally that nothing in the original description of *A. bellidiflorus* Willd. suggests this fastigiate habit, and why the name has been applied to this form is not clear. Plants with the heads somewhat smaller than usual occur rather frequently around the Great Lakes and westward, but in most cases these are to be interpreted as hybrids, or occasionally as due to crowding or poor nutrition.

This species can be distinguished from *A. praealtus* by the much deeper corolla-lobes, more ascending rameal leaves and non-rugose, softer, flatter, often more serrate cauline leaves with less conspicuous reticulum of the ultimate veinlets and more oblong veinlet areoles. The species seems to be largely an inhabitant of the heavier clay soils.

The oldest name previously applied to any member of this species concept is *A. Tradescanti* of Linnaeus. There has long been doubt, however, as to the application of this name. The matter has been discussed at some length by Dr. Gray and the synonomy worked out

by him as based on his extended study of types in the European herbaria.[1] Linnaeus's publication of *A. Tradescanti* was based on a two line description of little diagnostic value, and references to Hortus Cliffortianus, Hortus Upsaliensis, and Morison's Historia, the latter reference being the name-bringing citation. According to Gray, one of the two specimens in the Clifford herbarium is a small-headed form of the present species, the other being referable to *A. vimineus*. A specimen in the Linnean herbarium, from the Upsala garden, Gray says is the large headed *A. paniculatus*. A plant in the Morison herbarium, which according to Gray should probably be considered the type, is a small-headed form of the present species, and this is the form to which Dr. Gray would apply the Linnean name. A photograph of the Morison plant, taken by Professor Fernald, is in the Gray Herbarium. This photograph does not seem to match any American form unless it be a shade condition of some normally wild form. The specimen may have come from shaded or crowded colonies in the garden. The heads are rather small, but are not fully developed, and possibly would have been larger if they had matured. The rameal leaves are more elliptic, more lax, and less rigid than in all forms of this species, but resemble somewhat those of *A. saxatilis*. Indeed, the photograph suggests *A. saxatilis* very much in the panicle and rameal leaves, but the cauline leaves are more divaricate. There is, however, no reason to believe that the low and slender *A. saxatilis* was in cultivation in Europe at that early period. In the opinion of the writer, this Morison plant may very likely have been simply an undeveloped shaded individual of var. *simplex*, but we have no way of proving this. It may, however, have been a hybrid form of *A. paniculatus* with *A. lateriflorus* or *A. vimineus*. Dr. Gray applied the name to a race of small-headed, paniculate plants which he gave as ranging from "Canada to Virginia, Illinois, and Saskatchewan. Cultivated from the earliest days in European gardens." After vain attempts during the present study to establish such a species, the writer is now of the opinion that no such race exists in the wild state in America and probably nowhere in cultivation. The older European specimens bearing this name in the Gray Herbarium are apparently hybrids of *A. lateriflorus* with *A. paniculatus* or *A. praealtus*. In America, the specimens labelled *A. Tradescanti* by Dr. Gray, and

[1] Proc. Amer. Acad. Arts and Sci. xvii. 166 (1882), and Synopt. Fl. N. A. 1². 187 (1884).

those in the New York Botanical Garden Herbarium that served as a basis for Dr. Britton's, and in part for Mr. Burgess's treatment in the two editions of the Illustrated Flora, may be interpreted as hybrids with *A. lateriflorus, A. vimineus, A. missouriensis* var. *thyrsoideus, A. interior,* and *A. ericoides,* or in a few cases as straight *A. lateriflorus* or straight *A. vimineus,* or in some cases as simply undeveloped *A. paniculatus.* It seems impossible to detect a definite race among all these specimens. The mass of specimens is conspicuously marked by lack of uniformity. Because of this extremely vague and indefinite status of the name the writer believes that the best interests of taxonomy are served by abandoning it altogether.

The next oldest name is *A. paniculatus* Lam. The interpretation of this also is not easy. Prof. Lecomte writes that no type specimen exists in the Lamarck herbarium. Dr. Gray in his study of types says: "The proper herbarium of Lamarck at Rostock I have not been able to consult. But distinct traces of all the species, with one exception [*A. salicifolius*], have been found at Paris," and farther on: "A common and multiform northern species, the *A. Tradescanti* L., as to herb. and Hort. Ups. (but not of Morison), comprising *A. tenuifolius* and *A. simplex* of Torr. and Gray, Flora, mainly, exc. syn." From this it may be judged that he saw traces of this at Paris. In the Synoptical Flora Gray says: "Lam. Dict. i. 306 (1783, the char. not good for the involucre, but it is the *A. serotinus procerior,* & c., Tourn., cited by Lam.)." The original description is not very convincing and it is difficult to make much out of it. However, in view of Dr. Gray's rather positive statements concerning the identity of the name and the lack of further evidence as to what it might otherwise be, and in view of the long continued use of the name since Gray's time, it may well be retained for this species. Lamarck's statement that the leaves are narrowly lanceolate may be assumed to refer it to the narrow-leaved form. Previous to the Synoptical Flora and beginning with Torrey & Gray or before, the narrow-leaved variant here considered the typical form was usually called *A. tenuifolius* L. and the broad-leaved type *A. simplex* Willd.

The species is highly variable in many of its organs, apparently for the most part in response to the environment, but the writer has been unable to draw any specific lines within this general *A. paniculatus* complex. The plants differ only in general habit, width of leaves, and other superficial and variable characters, while the essentials of floral

and head structure remain the same. Many of these variants can often be found in the same field. Frequent intergrading specimens occur that unite the various trends in a perplexing way. The color of the rays, too, varies from pure white, the usual color, to lavender or pale blue in response apparently to some physiological or genetical disturbance about which we know little at present. Occasionally the color is due to hybridity, as shown by other characters. Hybrids are apparently common between *A. paniculatus* and other species as already stated. Those with *A. lateriflorus* and *A. puniceus* seem especially abundant in the east. Farther westward plants appearing to be crosses with *A. praealtus* and *A. missouriensis* var. *thyrsoideus* are frequent. Less common hybrids with other species occur. Among all these variants only the broad leaved form seems to be worthy of nomenclatural recognition. This may be a true race as its range does not wholly coincide with that of typical *A. paniculatus*. It is here recognized as follows:

Var. SIMPLEX (Willd.) Burgess in Britton & Brown, Ill. Fl. No. Sta. & Can. iii. 377 (1898), chiefly this, as also Robins. & Fern. in Gray, Man. ed. 7. *A. simplex* Willd. Enum. Hort. Berol. 887 (1809), this or *A. salignus;* Nees, Gen. et Sp. Aster, 91 (1833); Torr. & Gray, Fl. N. A. and Gray, Man. eds. 1–5. *A. paniculatus* of Gray, Synopt. Fl. in part, also of Gray, Man. ed. 7 in part, and Burgess l. c. in part. *A. Jacobaeus* Lunell, Amer. Mid. Nat. v. 56 (1917).—Leaves broader, 10–40 mm. wide, 11 times as long as broad or wider: involucral bracts averaging slightly wider.—A more southern and western variant: New Brunswick and southern Quebec to Virginia and West Virginia, or possibly to the mountains of North Carolina; westward to South Dakota, Nebraska and Missouri and perhaps Texas. The common and almost exclusive form in central New York, rare in Canada and northern New England. Strict individuals are more common in the northeast. Rather late flowering, from Aug. 20 to Oct. 15, chiefly in late September and early October. Second growth specimens of this variety, from cut-off or injured stems, or late flowering specimens from other causes, often have the heads more bunched in the axils of the large leaves and the involucral bracts broader.

There is some doubt as to the proper varietal name for this form. Apparently no previous author has had exactly the same conception as here adopted. Burgess' conception verges toward the second growth type mentioned above. He may have included specimens of the common hybrid *A. puniceus* × *A. paniculatus,* suggested by his words "inflorescence leafy," or this latter phrase may have reference merely to the condition found in many second growth specimens.

Robinson & Fernald's conception seems to have been nearly that of Burgess. The conception in Torrey & Gray's Flora and in Nees von Essenbeck's revision is very nearly ours. Dr. Gray in his study of types refers *A. simplex* Willd. to *A. salignus* Willd., and in the Synoptical Flora this latter, along with *A. simplex,* to *A. salicifolius* Scholler [not *A. salicifolius* Ait.] which he says: "represents a form of this same species [*A. paniculatus*] either very early naturalized in Hungary and Germany or possibly indigenous." *A. salignus,* as represented by the few specimens seen by the writer, all modern specimens from various parts of Europe, does seem somewhat different from any form of *A. paniculatus.* Its heads are large and the rays often colored, the involucre loose, frequently of more equal bracts, and the leaves more clasping, though not strongly so. Willdenow's original description is very good for our form except in the statement "calycibus laxe imbricatis" and in another part of the description "calyx imbricatus, squamis lineari-subulatis adpressis inferioribus subpatulis." He may have had *A. salignus* in mind or he may have had plants of the present variety. However, considering the long continued use of the name *A. simplex* for broad leaved forms of *A. paniculatus* it would seem justifiable to continue its use in that sense, since it can not be definitely shown to be something else.

Several varieties of *A. paniculatus* recognized in recent years require comment. Var. *bellidiflorus* (Willd.) Burgess has been discussed above, and its doubtful validity pointed out. Also the difficulty in interpreting Willdenow's *A. bellidiflorus* has been noted. Most of the herbarium specimens passing as var. *bellidiflorus* have been interpreted by the writer as *A. paniculatus,* a few only having broader leaves and thus belonging to var. *simplex.* The two hairy varieties proposed by Fernald seem to have been of hybrid origin. The var. *cinerascens,*[1] as represented by the cited Veazie specimen, has every appearance of a hybrid of *A. paniculatus* and *A. undulatus* L. The type specimen of var. *lanatus*[2] (Punk Island, Lake Winnepeg, *J. M. Macoun*) strongly suggests a hybrid of *A. paniculatus* or possibly *A. interior* with *A. puniceus* L. *A. paniculatus* var. *acutidens* Burgess[3] seems to have been a mixture as treated by Burgess and also by other authors. Judging from specimens so named it has been made up of hybrids of *A. paniculatus* and *A. puniceus,* which often have large

[1] Rhodora i. 188 (1899).
[2] Rhodora vi. 131 (1904).
[3] Britton and Brown, Ill. Fl. No. Sta. & Can. iii. 378 (1898).

teeth, hybrids of *A. missouriensis* var. *thyrsoideus* with *A. paniculatus*, and unusually large-toothed specimens of *A. paniculatus*. It does not seem to constitute a race.

4. A. SAXATILIS (Fernald) Blanchard, Amer. Bot. vii. 27 (1904). *A. vimineus* var. *saxatilis* Fernald, RHODORA i. 188 (1899), Gray's Man. ed. 7. *A. Tradescanti* var. *saxatilis* House, Bull. N. Y. State Museum, nos. 243–244, p. 27 (1923).—Low, 1.5–6 dm. high, slender: stems greenish, glabrous or nearly so, branched above only: branches rather short, ascending-spreading: leaves rather thin, glabrous, usually ascending, 3–10 cm. long, linear or linear-lanceolate or narrowly elliptic-lanceolate, 9–13 times as long as wide or sometimes narrower, acute but scarcely acuminate, subentire, sparingly scabrous on the margin; rameal leaves not numerous, the upper distant and much reduced, linear-lanceolate, rather soft, usually divaricate, indistinctly scabrous or smooth: heads small, rather few in a small loose terminal non racemose panicle, or on rather long branchlets: involucre 3.3–4.5 (5) mm. high; bracts narrow, usually sparingly ciliate: ray corollas (14) 17–25 (27) in number, rather short, (4.3) 5–8.2 mm. long, white: disk corollas about 3.2 mm. long; the lobes 30 to 45 per cent of the length of the whole limb: pappus hairs 25–43 in number, rather short (2.5–3.5 mm. long): achenes about 1.5 or 1.8 mm. long, strigose.—Ledgy, gravelly, or sandy often moist banks and shores: southwestern Nova Scotia and southern Maine from Washington County to Oxford and Cumberland Counties, extending up the Penobscot River to the Katahdin region; also in southern and western Vermont. Flowering period July 20–Sept. 10, averaging rather earlier than related species. Some specimens examined: NOVA SCOTIA: above Bridgewater, 1921, *Fernald & Long*, no. 24639; Sandy Cove, 1920, *Fernald & Long* and others, no. 22762 and 22764; various places in Yarmouth County, 1920–1, *Fernald & Long* and others, nos. 22763, 22765, 24635, 24636, 24637, 24638, 24640. MAINE: Marshfield, 1916, *C. H. Knowlton;* Katahdin Basin, 1898, *E. D. Merrill;* Mattawamkeag, 1898, *Fernald*, no. 2682; Upper Stillwater, 1895, *Fernald*, no. 361 (TYPE of var. *saxatilis*); Veazie, 1908, *Fernald*, nos. 286 and 287; Orono, 1908, *Fernald*, no. 286, not typical; Fairfield, Somerset County, 1916, *Fernald & Long*, no. 14725; Madison, 1894, *Fernald;* Bowdoinham, 1921, *N. C. Fassett*, no. 104; Gilead, 1897, *K. Furbish;* Clinton, 1909, *R. C. Bean;* Winslow, 1898, *E. B. Chamberlain*, no. 763. VERMONT: Williston Gorge, Chittenden Co., 1899, *W. W. Eggleston.*

This plant was first described as a variety of *A. vimineus*. Typical specimens show a relationship to this species only in the small heads and rather soft rameal leaves. It differs in the less branched habit, shorter and more ascending branches confined more to the upper part of the plant, more ascending leaves, non racemose long-peduncled heads, longer involucre (3.5–4.0 mm. instead of 3.0–3.6 mm.), and

longer ray corollas (5–8 mm. instead of 3–5.8 mm.). Its affinity seems to be with *A. paniculatus* but the plant is smaller, grows on drier soil, possibly flowers earlier, has leaves of a different shape and texture, smaller heads, fewer and generally shorter rays, and shorter pappus hairs. It seems to be a fairly good species.

5. **A. interior**, sp. nov. *A. carneus* γ *ambiguus* T. & G. Fl. N. A. 1^2 133 (1841) or that a hybrid, not *A. ambiguus* Bernh. *A. Tradescanti* in part, and *A. paniculatus* in part, of Gray's Synopt. Fl. *A. Tradescanti* in part, of Gray's Man. ed. 7.

Caulibus ramosis inferiore parte glabris superiore in lineis pubescentibus, ramis adscendentibus vel patulis; foliis lanceolatis vel oblanceolatis vel fere linearibus 8–20-plo longioribus quam latis firmis non coriaceis planis subintegris scabrociliatis subtus glabris supra plus minusve scabris vix rugosis, venis plus minusve distinctis, areolis irregularibus laxis longioribus quam latis, foliis ramorum copiosis 1–3 cm. longis elliptico-lanceolatis subacutis; capitulis numerosissimis parvis subracemosopaniculatis vix secundis, involucris 3–4 mm. longis, bracteis angustis subglabris brevibus; ligulis 22–36 4.4–8.5 mm. longis albis vel purpureotinctis; lobis corollarum florum disci 30 ad 45 per centum totius limbi; capillis papporum 30–60 numero 2.8–4.5 mm. longis.

Plant of medium height, glabrous below, sparingly pubescent in lines above, much branched when well developed; branches ascending-spreading: leaves lanceolate, oblanceolate or nearly linear, 8–20 times as long as wide, firm but not coriaceous, mostly flat, more or less olive green when dry, entire or sparingly serrate, scabrous ciliate; lower surface glabrous and smooth; upper surface more or less scabrous, scarcely rugose; veins moderately distinct; areolae irregular, loose, chiefly longer than broad; lateral veins rarely developed; rameal leaves very abundant, 1–3 cm. long, elliptic-lanceolate, rather abruptly acute, not rigid: heads very numerous, small, on short branchlets, more or less racemosely paniculate on the branches, scarcely secund: involucre 3–4 mm. high, of narrow linear or oblanceolate, rather firm, imbricated, only moderately acute, nearly or quite glabrous or ciliate bracts, rather conspicuously shorter than the pappus: ray corollas 22–36 in number, 4 4–8.5 mm. long, lavender or white: disk corollas (2.6) 3.0–4.5 mm. long; lobes 0.6–0.9 mm. long, 30 to 45 per cent of the length of the whole limb: pappus hairs 30–60 in number, 2.8–4.5 mm. long; achenes as in other species.—Generally prairie country: Buffalo, New York, northern and western Ohio, southern Michigan, and Illinois; possibly also in central Wisconsin, Missouri and Louisiana. Specimens examined: NEW YORK: Buffalo, *G. W. Clinton.* OHIO: *Dr. Paddock* (type of *A. carneus* var. *ambiguus* T. & G.); Prairie of Ohio, *Riddell.* MICHIGAN: Detroit, 1900, *O. A. Farwell*, no. 1346; Botanic Garden, Mich. Agric. College, 1895, *C. F. Wheeler.* ILLINOIS: 1881, seven specimens, *J. Wolf;* Canton, 1893, *Wolf* (TYPE in Gray

Herb.); Peoria, *Dr. Stewart.* The specimens from Wisconsin, Missouri, and Louisiana are not typical and may be hybrids of this species with others, or hybrids of related species.

This seems to be a good species although it crosses freely with others. The small heads have frequently led to its confusion with the supposedly small-headed *A. Tradescanti.* The Paddock specimen on which the var. *ambiguus* T. & G. was based has rather more deeply lobed corollas and an aberrant look, and may be a hybrid with *A. lateriflorus.*

6. A. LAETEVIRENS Greene, Pittonia, iv. 219 (1900). *A. Osterhoutii* Rydb. Bull. Torr. Bot. Club xxxi. 654 (1904).—Stem rather low, 3–8 dm. high, glabrous below, pubescent in lines above, often purplish, usually simple or subsimple, terminating in a generally subcorymbose panicle which is small for the group; its branches 5–8 (15) cm. long, ascending: leaves thick but not coriaceous, rarely at all rugose, pale, glabrous, lanceolate or oblong-lanceolate; cauline 5–9 cm. long, about 12 mm. wide, acute, only a little narrowed to a slightly or sometimes conspicuously clasping base; margins entire or low-serrate, scabrous; veins rather prominent, pale, some of them looped along the often triple-nerved, pale midrib; ultimate areolae indistinct, coarse, longer than broad; rameal leaves not much reduced, clasping: heads rather large, somewhat clustered toward ends of branches: peduncles short, leafy: involucre 5.5–7 mm. high; bracts firm, in few ranks, the outer usually shorter, oblong to lance-oblong, acute or the outer barely so, glabrous or sparingly ciliate; margins and base pale except sometimes in the outer, the green part usually indistinct below, dilated above, frequently with a pale median line: rays lilac or white, rarely purplish, with corollas 8–14 mm. long, 1.0–1.5 mm. wide: disk corollas narrowly funnel-form or tubular; lobes short, 0.6–0.9 mm. long, 18 to 28 per cent of whole length of limb: pappus hairs 35–70, each 5–6.5 mm. long: achenes apparently larger than in the other species (2–3 mm. long).—Damp banks and shores: Idaho, Saskatchewan and the bad lands of North Dakota (Herb. N. Y. Bot. Gard.) to Colorado, New Mexico and Arizona, chiefly in the mountain states. Some specimens examined: SASKATCHEWAN: Gander Lake, 1895, *Macoun,* no. 10237. IDAHO: Boise, 1897, *L. F. Henderson,* no. 2993. MONTANA: Missouri River, 1883, *L. F. Ward,* no. 3. WYOMING: Hutton's Lake, 1898, *A. Nelson,* no. 5293; Seven Mile Lakes, 1901, *Nelson,* no. 595; Laramie, 1901, *Nelson,* no. 8668; Lusk, 1911, *Nelson,* no. 9606. COLORADO: alt. 6000–8000 ft., 1877, *E. L. Greene,* no. 1122; below Steamboat Springs, 1899, *G. E. Osterhout,* no. 13; San Luis Valley, 1873, *J. Wolfe,* no. 500; along the Poudre, 1895, *C. S. Crandall,* no. 50. NEW MEXICO: 1847, *Fendler,* no. 360; Valley of Sierra de las Animas, 1851, *C. Wright,* no. 1157. ARIZONA: Black River Flat, 1874, *J. T. Rothrock,* no. 789; Speed Ranch, Rincon Mts., 1909, *J. C. Blumer,* no. 3474.

This species stands somewhat between *A. coerulescens* and the *A. adscendens* group. The texture and venation of the leaves are very similar to those of *A. adscendens*, as are also the firm bracts, but these latter are acute, and the heads are short-peduncled and more paniculate. In all the detailed measurements of parts of the head and florets it corresponds closely with *A. coerulescens* to which it is evidently related. Whether it should be considered as a member of the Salicifoliae is however open to question. The innermost bracts of the involucre are generally said to be narrower than the others, a condition which is said not to be the case in other species here treated, and the outer bracts are said to have a whitish median line. These statements are commonly true, though often not conspicuously so, but the same is frequently true also of *A. coerulescens* and perhaps of other species; at least they are not clear-cut characters.

Several other names exist that belong to this group of Asters. In 1815 Barton[1] proposed *A. philadelphicus*, later[2] making it a synonym of *A. tenuifolius* Willd. A Barton specimen bearing the Prodromus label in the herbarium of the Philadelphia Academy is straight *A. ericoides* L. At the same time Barton proposed *A. tenuiculus* which later he made a variety of *A. fragilis*. Four specimens of this are in the Barton herbarium, of which three are noted as "from my garden." The fourth, which may be considered the type, bears the Prodromus label and is *A. vimineus*. The others are *A. dumosus*, *A. ericoides* and *A. lateriflorus* var. *pendulus*. These Barton names were not included in the Kew Index.

In the Flora of North America, Torrey and Gray[3] described *A. Greenei* from "Near Boston, *Dr. B. D. Greene! Dr. Pickering!* (in *herb. acad. Philad.*)." The writer has been unable to locate the Greene specimen but the Pickering specimen is still in the herbarium of the Philadelphia Academy. This does not represent any straight species but seems rather to be a hybrid of *A. lateriflorus* and *A. puniceus*. The habit is that of the former species but the corolla lobes are shorter, the heads larger, the leaves broader, more clasping, and more scabrous, suggesting *A. puniceus* and some of the cauline hairs are slightly thickened at the base. The description, too, rather suggests this interpretation. It is not at all *A. praealtus* var. *angustior* which one might suspect it to be from the locality.

[1] Prodr. Fl. Philadel. 81 (1815).
[2] Comp. Fl. Phila. (1818).
[3] Fl. N. A. ii. 134 (1841).

In 1903 Burgess proposed *A. agrostifolius*,[1] based chiefly on specimens of *A. lateriflorus* var. *pendulus* (Ait.) Burgess, judging from specimens in the herbarium of the New York Botanical Garden. In 1917 Lunell[2] described two new Asters, *A. chelonicus* and *A. clivorum*, from the foot-hills of the Turtle Mountains, Rolette County, North Dakota. The type specimens of these species, now in the herbarium of the University of Minnesota, are intermediate between *A. laetevirens* and *A. paniculatus* var. *simplex* as to leaves and involucre. Both species were known to their author from the type specimens only. Further study in that vicinity is necessary before they can be accurately placed.

It has been suggested by A. S. Pease in the paper already cited that *A. tardiflorus* is a hybrid of *A. cordifolius* and *A. puniceus*. Not all specimens so labelled in the Gray Herbarium have been seen by the writer, but several in the Cornell Herbarium certainly seem to bear out this conclusion, at least as far as most specimens called *A. tardiflorus* by American authors are concerned. There are at hand, however, several specimens from the Gray Herbarium, labelled *A. tardiflorus* and having rather narrow leaves, that are apparently hybrids of *A. puniceus* and *A. paniculatus*.

It may be of interest that specimens have recently come to light extending the range of *A. vimineus* Lam., along the Fall line through Georgia and down to the Apalachicola region of Florida. The plant has not yet been seen from North and South Carolina. *A. vimineus* was one of the species of white asters treated in the previous paper. *A. ontarionis* Wiegand, also a species treated in the previous paper and there reported from only one locality in Canada, has been found to be fairly frequent along the Canadian side of the St. Lawrence river from Kingston to Brockville.

Cornell University.

Desmodium glabellum in northeastern Connecticut.—In July and September, 1932, botanizing trips were made to Obwebetuck Hill, which is situated in the extreme south-southwestern part of Windham County, in the town of Windham. This is a wooded hill with dry soil, and is especially suited to the genera *Desmodium* and *Lespedeza*, as well as to other dry soil plants.

[1] *A. agrostifolius*, Small's Fl. Se. U. S. 1226 (1903).
[2] *A. chelonicus*, Amer. Mid. Nat. v. 45 (1917), *A. clivorum*, l. c. v. 55 (1917).

Desmodium glabellum was occasional on the hillside. This is a rare species which had been reported in the state only at Waterford (*Graves*). Mr. C. A. Weatherby states that the only other record for this species in New England is one from Massachuetts, which is not well authenticated, and that this new station in Windham may very probably be the northeasternmost for the species. It was interesting to note that at least seven other Desmodiums were in evidence.

Another rare species, though less so in general than *Desmodium glabellum*, was *Eupatorium sessilifolium*, which had not previously been reported from the county. A few plants were found on the first visit, and the last yielded a few more.

A third species new to the county, *Acalypha digyneia*, grew in small quantity about the ledges at the summit of the hill.

Besides the above, there were noted the following species whose ranges, as given in the Catalogue of Flowering Plants and Ferns of Connecticut, include Windham County, but which are at least very uncommon there:—*Desmodium bracteosum*, which was occasional and which, like the three following species, apparently does not occur in central and northern sections of the county; *D. canescens*, a single small colony; *Geum flavum* in fair numbers; *Polygonum virginianum*, a few plants; *Agrimonia mollis* in some quantity; and *Panicum Boscii*, var. *molle*, scattered through a considerable area in the woods.

Other less rare species, previously noted in the county, but not very generally distributed, were *Desmodium paniculatum*, *D. rigidum*, *Lespedeza procumbens*, *L. virginica*, *Anychia canadensis*, *Solidago ulmifolia*, *Corallorrhiza odontorhiza* and *Erigeron pusillus*.

On one of the trips, a short stop was made in Canterbury, where Mr. Weatherby located × *Lysimachia producta*, the second record for the county.—Alan W. Upham, East Woodstock, Connecticut.

Diarrhena festucoides again.—In Rhodora, xxxiv. 204 (1932), I made the avowedly new combination *Diarrhena festucoides*, based upon *Diarina festucoides* Raf. Med. Repos. hex. 2, v. 352 (1808). At that time I stated that the spelling *Diarrhena*, starting with Beauvois (1812) and conserved under the International Rules, was not a mere change of spelling of Rafinesque's generic name. Several friends, including Mr. Mackenzie and Professor Hitchcock, point

out to me that I was in error: that Beauvois gave as a synonym of his *Diarrhena* "*Diarrhena* SMART" and in the Index "DIARRHENA *Schmal.*" Beauvois, then, was merely changing the spelling and stumbling over the authorship of *Diarina* Rafinesque-SCHMALTZ.

This being the case, *Diarrhena* Raf. in Beauv. (1812) is merely a change of spelling, not apparently sanctioned by its original author, of *Diarina* Raf. (1808). Consequently, the correct combination, *Diarrhena* (under the discarded spelling *Diarina*) *festucoides* goes back to its source, Rafinesque (1808). The question raised, whether species legitimately published under invalid or no generic names can stand, is still open. In view of obvious differences of judgment on this academic point, which is not definitely covered by the International Rules, I have referred the matter for study to the Executive Committee on Nomenclature appointed at Cambridge.—M. L. FERNALD.

FICUS CARICA IN MASSACHUSETTS.—In the fall of 1931 Mr. Gilbert Emery sent to Boston, for identification, a fragment of a leaf from a strange plant observed by him in Whitman, Massachusetts, for two successive years.

Wishing to see more of the plant, the writer went to Whitman on November 17, and after examining a large area of waste ground—the most probable habitat—discovered the shrub growing in a vacant field, on the sunny side of an old shed, close to the building. The plant was about four feet high, well branched, and bore several small green fruits. Specimens later shown to Dr. Alfred Rehder and Mr. J. B. Mackintosh were identified by them as the fig, *Ficus Carica* L.

Figs are often grown for ornamental and commercial purposes, and in southern New England will live outside during the summer, but records of persistent escapes as far north as Whitman may not be very numerous.—S. N. F. SANFORD, Boston Society of Natural History.

Volume 34, no. 408, including pages 233 to 263, 8 plates and title-page of the volume, was issued 14 December, 1932.

Denuded granitic Crest back of Burgeo (upper); Transported Boulders on Crest near Grandy Brook (lower).

FEB 8 1933

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB

Conducted and published for the Club, by

MERRITT LYNDON FERNALD, Editor-in-Chief

JAMES FRANKLIN COLLINS
CHARLES ALFRED WEATHERBY } Associate Editors
LUDLOW GRISCOM

Vol. 35. February, 1933. No. 410.

CONTENTS:

Annotations on Herbarium Sheets. *H. A. Gleason* 41
New Species and Forms from the United States. *H. C. Benke* 44
Recent Discoveries in the Newfoundland Flora (continued). *M. L. Fernald* 47
Pylaiella fulvescens (Schousb.) Bornet. *R. E. Schuh* 63
Calamagrostis epigejos, var. georgica in America. *M. L. Fernald* .. 64
Cynoglossum amabile in Massachusetts. *S. N. F. Sanford* 66
Color Variation in Hepatica acutiloba. *E. Anderson* 66
Panicum dichotomiflorum, var. puritanorum in New Hampshire. *C. A. Weatherby* 68

The New England Botanical Club, Inc.

8 and 10 West King St., Lancaster, Pa.

Room 1001, 53 State St., Boston, Mass.

RHODORA.—**A monthly journal of botany, devoted primarily to the flora of New England. Price, $2.00 per year, net, postpaid, in funds payable at par in United States currency in Boston; single copies (if available) 20 cents. Volumes 1–8 or some single numbers from them can be supplied only at advanced prices which will be furnished on application. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be considered for publication to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than two pages of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.**

Address manuscripts and proofs to

M. L. FERNALD, 14 Hawthorn Street, Cambridge, Mass.

Subscriptions (making *all remittances* **payable to RHODORA) to**

Ludlow Griscom, 8 W. King St., Lancaster, Pa., or Museum of Comparative Zoology, Cambridge, Mass.

Entered at Lancaster, Pa. Post Office as Second Class Mail Matter.

INTELLIGENCER PRINTING COMPANY

Specialists in Scientific and Technical Publications

EIGHT WEST KING ST., LANCASTER, PA.

CARD-INDEX OF NEW GENERA, SPECIES AND VARIETIES OF AMERICAN PLANTS, 1885 TO DATE.

For American taxonomists and all students of American plants the most important supplement to the Index Kewensis, this catalogue in several ways exceeds the latter work in detail, since it lists not only the flowering plants, but ferns and other vascular cryptogams, and includes not merely genera and species, but likewise subspecies, varieties and forms. A work of reference invaluable for larger herbaria, leading libraries, academies of sciences, and other centers of botanical activity. Issued quarterly, at $22.50 per 1000 cards.

GRAY HERBARIUM of Harvard University,
Cambridge, Mass., U. S. A.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. DAY. Leatherette. Pocket size. Invaluable for collector's memoranda and herbarium records. Published and sold by the GRAY HERBARIUM, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

MEMOIRS OF THE GRAY HERBARIUM. A series of illustrated quarto papers issued at irregular intervals, sold separately.

No. III. The Linear-leaved North American Species of Potamogeton, Section Axillares, by M. L. Fernald. 183 pp., 40 plates, 31 maps. 1932. $3.00.

Gray Herbarium of Harvard University, Cambridge, Mass.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3/4 in. 1 year $4.00, 6 months $2.50.

Up the Humber from Hannah's Head (upper);
Marble Mt. at right. Mt. Musgrave in background.
Horizontal Limestones, Old Port au Choix (lower).

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 35. February, 1933. No. 410.

ANNOTATIONS ON HERBARIUM SHEETS

H. A. Gleason

It is now generally recognized that a species is an abstract mental concept, synthesized from the structural characters of various individual plants. To this concept is given a binomial name. The same binomial, when written on a herbarium sheet, does not indicate the name of the individual plant there displayed, but the concept under which the individual is placed. The assignment of the individual to a certain concept constitutes identification.

The original synthesis of a specific concept dates back to the first description of the species, while the name under which this concept is known can not be earlier than 1753. In the casual identification of plants, botanists accept without question the concept of earlier students, learning it from printed descriptions or from comparison with specimens bearing the appropriate name. In monographic study botanists form concepts of their own. If these concepts coincide with earlier ones, in the opinion of the student, the original idea is continued; if not, new species or subspecies are proposed or two or more concepts united under a single name. All botanists know how specific concepts vary, partly through accumulation of material for study and partly through mere change in mental attitude.

The name which appears on a herbarium sheet represents the opinion of some person. It may have been placed there by a skilled botanist who has given years to the study of this particular group, or by one who has given the plant only the most casual or perfunctory

examination. It is obvious that a grass, collected by a high school student and labeled *Panicum praecocius*, is of far less value in illustrating that specific concept than if it were so identified by Hitchcock and Chase, who described the species originally. The high school boy may be right, and Hitchcock and Chase may conceivably be wrong, but we feel far more confident of the accuracy of identification in the latter case than in the former. Furthermore, an identification by Hitchcock during his first years as a botanist is obviously less reliable than one made at the present time.

In general, the probability that a specimen is correctly identified, that is, that it correctly illustrates a certain specific concept, depends largely on the person making the identification and on the date when it was made. Each person identifying a plant in our reference herbaria should therefore add or have added to the label his name and the date, for example, *det. John Smith, 1932.* If John Smith is a botanist of recognized ability in 1932, his identification will have authority accordingly; if in 1972 he is the leading taxonomist of the world, his identification of 1932 will nevertheless carry relatively little weight.

All large herbaria include numerous sheets on which identifications have been written by persons of authority who can not now be known except through a knowledge of their handwriting. During the course of our own studies we learn to recognize some of these, but we shall make it much easier for those who follow us if we will add to these old annotations such statements as *written by Asa Gray*, or *Martius scripsit*, as I have seen in European herbaria.

The method by which an identification is made is also valuable information. We all realize the difficulty of using printed descriptions only, and we often add to specimens so identified the abbreviation *ex char.* This should always be done. If we assign the name as a result of comparison with other specimens, we should indicate that, and if practicable cite the particular specimens with which comparison was made, since the source material may be incorrectly named. Such a legend as = *type in Herb. Kew.* gives immediate authority to the name, tempered only by the possible question of our ability to make an exact comparison.

While the name on the label may have been written originally by a person without experience or detailed knowledge, it may be correct. Later students of the group, who are able to speak with authority,

recognize the name as correct and pass it without comment. The value of the identification is immediately raised if such persons add their own annotation to that effect, as *confirmed by Gray, 1882,* or *accepted by Bentham, 1867.* I know of specimens in the family Melastomataceae which have certainly been examined successively by Naudin, Triana, and Cogniaux. It would certainly add much to the value of the specimen if each of these masters of the family had indicated his approval of the name.

Most monographs and some floras cite by collector and number the specimens upon which their descriptions are based. Duplicates of these numbers should always mention this citation, as *Cited by Niedenzu, Pflanzenreich* **4**[141]: 493. At the New York Botanical Garden, where many old Brazilian specimens are deposited, sheets are stamped with indelible ink *This number is cited under this name in Flora Brasiliensis,* or, where the original name has been changed, *This number is cited in Flora Brasiliensis as* ———. And of course types, isotypes, cotypes, and topotypes should always be designated, even if the species which they represent are no longer valid.

When dissections are made by a student from herbarium material, and detailed notes and drawing made from them, copies of both should be attached to the sheet whenever possible. In the great majority of cases this will obviate any necessity of further dissection in the future and will help greatly toward keeping the specimen in good condition. Some types in older European herbaria have been nearly destroyed by the inroads of monographers, without any record of their findings being left for the benefit of their successors.

In making annotations, the original label should never be rewritten, obscured, or destroyed. It may have considerable historical value. In my opinion, it makes relatively little difference whether the notes are written on the sheet itself, or on an annotation label which is pinned or pasted to the sheet. Many herbaria have regulations in this respect which can easily be followed.

Most herbaria are generous in lending material to students, notwithstanding the risk of loss or damage in shipment. If we profit by the examination of borrowed material, we should at least try to improve the material by returning it fully annotated.

New York Botanical Garden.

NEW SPECIES AND FORMS FROM THE CENTRAL AND SOUTHERN UNITED STATES

H. C. Benke

During late winter and through the spring of 1930, another great-circle tour southward was undertaken by the author. This trip began in the latter part of February and was completed by the beginning of June.

Leaving Chicago, a southeasterly direction was taken over the Ohio River valley, the Allegheny foot-hills and thence through Alabama, striking the Gulf of Mexico near the Florida line; thence zigzaging coast-wise west and southwest all the way to the border of Mexico about Brownsville, Texas, coming scarcely 100 km. inland at any point. The return trip was made over the edge of the Great Plains, through the Ozark region and crossing the Mississippi River at Quincy, Illinois. Numerous exploratory side-trips were made, so completing some 5,000 km. of travel, by making use of a great variety of transportation.

Specimens and, in most cases, duplicates with notes were taken of such plants as indicated extension of range, flowering season or other unusual data, or promised new taxonomic material, some of which is being studied by other workers, mostly specialists; but my own work with a portion of the collection has yielded some novelties which are now available for publication.

I. The *Eustoma* noted about the mouth of the Rio Grande at the time of the visit was of the smaller-flowered species—*E. exaltatum*—brightening the landscape in purple, but very locally. One small colony was seen in which the corollas were pure white. This may be separated as:

Eustoma exaltatum (L.) Griseb., forma **albiflorum**, f. nov., corolla alba, siccato ochroleuca.—Texas: Brownsville, Cameron County, March 25, 1930. *H. C. Benke* 5409 (type, Field Museum).

With the species; corolla white, turning cream-color on drying.

II. *Verbena officinalis*, like many other species which are adventitious from the old world, occurs only locally, but in large and well-established colonies, for it is one which takes kindly to its new environment. It was seen at points in Texas with its very small corolla in purple hue rather different from descriptions in European Floras as white, pale lilac or lilac in color.

At Kingsville was noted a very considerable colony of this species,

with beautiful rose-purple corollas, differing strikingly from the others, and from descriptions alluded to. No plants with white corollas came under observation. The new color-form:

VERBENA OFFICINALIS L., forma **roseiflora**, f. nov., corolla intense rosea.—TEXAS: Kingsville, Kleberg County, March 28, 1930. *H. C. Benke* 5418 (TYPE, Field Museum).

Corolla deep rose-color, otherwise like the species.

III. In the case of *Stachys agraria*, which is rather common in coastal Texas, the albino form is rare—only a few plants having been seen and these in but one locality near Corpus Christi. The species usually had corollas of an attractive purple-blue, with the coloration extended to the calyx-teeth. The unusual form:

STACHYS AGRARIA Cham. & Schlecht., forma **albiflora**, f. nov., corolla alba; calicis dentibus viridibus.—TEXAS: Corpus Christi, Nueces County, March 31, 1930. *H. C. Benke* 5420 (TYPE, Field Museum).

With the species; corolla pure white; calyx-teeth green.

IV. For some time past, the Colby brothers have been mentioning some "beautiful pink Blood-root" as occurring in the woodlands about Crystal Lake, Illinois, but it was not until this spring, 1932, that some specimens were sent me by Mr. Earl H. Colby of Crystal Lake. The brothers are all friends of nature, and especially of the wild flowers—one of them, Mr. Carl Colby of Pittsville, Wisconsin, has on various occasions sent in rare and interesting specimens which may be seen in Field Museum and other Herbaria. It is deemed very appropriate to name this rare plant for the brothers:

SANGUINARIA CANADENSIS L., forma **Colbyorum**, f. nov., petala laete rosea.—ILLINOIS: Crystal Lake, McHenry County, May 1, 1932. *Earl H. Colby* Mus. No. 652805 (TYPE, Field Museum).

With the species; petals bright pink.

In the fall of 1931, my trip through the Illinois Ozarks in the far southern portion of the state was rewarded in uncovering some new plants, two of which are ready for recording as below:

V. ZIZIA **sylvatica**, sp. nov., planta *Z. cordatae* similis sed gracilior altiorque; foliis radicalibus cordatis, caulinorum uno vel pluribus quoque cordatis, nullo modo lobatis; foliis superioribus 2–3 ternatim decompositis vel lobatis.—ILLINOIS: Tunnel Hill, Johnson County, Sept. 5, 1931. *H. C. Benke* 5252 (TYPE, Field Museum).

Aspect of *Z. cordata*, but more slender and tall; basal leaves cordate, and in addition one or more cauline leaves also cordate, long-petioled and not at all lobed; uppermost leaves 2 to 3-ternately compound or variously lobed.

Plants were seen in considerable numbers in a region which is wild and primitive, but all in the deep shaded woods, hence the name.

The type specimen has 6 to 8 rays in the umbels; lower two cauline leaves ovate-cordate, undivided, the first or lower 5 cm. wide x 6 cm. long, 12 cm. up the stem, the second 4 x 6 cm., about 14 cm. farther up (at ¾ distance up the entire plant); petiole of lower cauline cordate leaf 10 cm. long, of upper 3 cm. long; uppermost leaves as described above.

There is one other specimen of this species in Field Museum Herbarium and it also is from Illinois. It was recorded as *Z. cordata* (Walt.) DC. Illinois: Beverly Hills, L. Chicago Basin, Cook County, June 24, 1920. *Donald C. Peattie* 457. One long-petioled, cordate leaf occurs on the stem, 18 cm. above the base—about half-way up.[1]

The position of this species among others of the genus *Zizia* is seen in the following key:

a. Leaves all 2–3 (5)-ternately compound or lobed.....*b.*
  b. Umbel of many (averaging about 18) stout rays; plant of fields and meadows, mostly....................*Z. aurea* (L.) Koch.
  b. Umbel of few (av. about 8) weak rays; plant of woodlands, mostly..................*Z. Bebbii* (Coult. & Rose) Britton.
a. Some of the leaves cordate, undivided, long-petioled.....*c.*
  c. Cauline leaves all divided; rays of umbel rather as in *Z. aurea;* plants mostly of open ground.......*Z. cordata* (Walt.) DC.
  c. One or more cauline leaves undivided; other leaves and umbel rather as in *Z. Bebbii;* plants of shaded woods.....*Z. sylvatica.*

VI. Among the hills of southern Illinois, particularly in the swamps and valleys below, there occur patches of beautiful caerulean blue of the *Eupatorium coelestinum* in its season, reminding one very much of that garden favorite, *Ageratum.* In several places this was varied by the same species in most charming and impressive red-purple, hence:

Eupatorium coelestinum L., forma **illinoense**, f. nov.. formae typicae similis, floribus pulchre rubro-purpureis differt.—Illinois: Creal Springs, Williamson County, Sept. 6, 1931. *H. C. Benke* 5272 (type, Field Museum).

Like the species, but with the flowers of a rich red-purple color.

Some miles away, but in the same county, a colony of the same form had been seen, a specimen is also in Field Museum Herbarium, Illinois: Marion, Williamson County, Sept. 3, 1931. *Benke* No. 5271.

I have seen the species in neighboring states, but not in this novel form (though it may be expected to occur), hence the name.

Chicago, Illinois.

[1] This specimen bears the notation on the label "shaded ditch," which would further seem to confirm the habitat of this species.

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. Fernald

(*Continued from page 16*)

But when we got above the timber, on the exposed limestone slope, the most amazing sight of all greeted us, solid carpets covering acres of slope, like a lawn, with three dominant plants: *Botrychium Lunaria* by thousands, growing 20 to 30 to a turf 2 decimeters across, the plants 1.5–2.5 dm. high, with sterile fronds up to 1 dm. long, so abundant that it was impossible to step without crushing the fronds; *Anemone multifida*, a local plant in Newfoundland or anywhere else, the larger clumps with 10 to 60 peduncles bearing rosy-pink flowers or whitish cottony heads of fruit; and *Festuca brachyphylla* Schult., frequent enough in western Newfoundland but not often in such abundance. Of course there were other things, the usual calciphiles of western Newfoundland: *Asplenium viride* Huds. (unless we are to take up for it the earlier *A. Trichomanes-ramosum* L.[1]), *Woodsia glabella, Cryptogramma Stelleri* forming turf, *Thelypteris Robertiana* (Hoffm.) Slosson, *Polystichum Lonchitis, Anemone parviflora, Arc-*

[1] This species has been universally known as *Asplenium viride* Hudson (1762). Nevertheless, the plant had an earlier and properly published name in *A. Trichomanes-ramosum* L. Sp. Pl. ii. 1082 (1753). The Linnean species drew its compound specific epithet from *Trichomanes ramosum* of Bauhin and of Ray and it was treated by Linnaeus as a species, *A. Trichomanes-ramosum*, in all three editions of *Species Plantarum*, a species wholly apart from *A. Trichomanes* L. (1753). When Hudson published *A. viride* (as *A. viridi*) he, likewise, cited as synonyms *Trichomanes ramosum* of Bauhin and of Ray. The Linnean name was promptly thrown aside in favor of Hudson's *A. viride*, apparently because the name given by Linnaeus might suggest to the uninformed that a forking state or perhaps a hybrid of *A. Trichomanes* L. was intended; and the name *A. Trichomanes-ramosum* even disappeared from the synonymy. Christensen, however, in *Index Filicum*, correctly cites it as a synonym of *A. viride* and suggests that it is the best name; but he refrains from following priority in this case and retains the later and more familiar name, saying

viride Huds. Fl. Angl. 385. 1762. . . . .
A. Trichomanes ramosum L. Sp. 2. 1083. 1753 (prob. nom. opt.).

At the same time (1753) Linnaeus had two other species with compound trivial names, *Asplenium Adiantum-nigrum* and *A. Ruta-muraria.* Lamarck tried to improve upon the former by renaming it *A. nigrum* (1778) and on the latter by calling it *A. murorum* (1778). Yet all botanists reject *A. nigrum* and retain the compound *A. Adiantum-nigrum;* and it would be almost sacrilege to call the Wall Rue anything but *A. Ruta-muraria.* The present rules of nomenclature do not allow us to discriminate against the name *A. Trichomanes-ramosum,* unless it is "a permanent source of confusion or error." Decision of the latter point is not always simple nor unanimous: to the uninformed the name *A. Trichomanes-ramosum* might be a source of confusion; to the thoroughly informed not. Similarly with *Juncus alpino-articulatus* Chaix. (1786) for the plant generally called *J. alpinus* Vill. (1787), the name *J. alpino-articulatus* might easily be a source of confusion, as suggesting some entanglement with the earlier *J. articulatus* L. (1753). Absolute clarity favors the retention of *Asplenium viride* and of *Juncus alpinus.* See note under *Juncus alpinus* in Part III.

naria dawsonensis Britton, etc. *Orobanche terrae-novae* Fern.,[1] in young flower, was superabundant; *Draba arabisans*, in a characteristic form with crowded fruits, was everywhere; and in the dry humus at the summit were two Antennarias with fuscous or brown involucres, wholly different from one another and both needing names (PLATES 265 and 268).

Evening was approaching and it was necessary to go down to the waiting motor boat; and we had only just begun the exploration of Hannah's Head. From the inner edge of the area we were on we looked up river to a continuation (PLATE 234) of the mountain falling as a sheer wall of white limestone to the Humber and at its base having a splendid talus. There, of course, are other species; but darkness was coming on and we were forced to quit. The big cliff and talus, easily accessible, still await exploration; and to the north, back of Hugh's Brook, we could see still another white wall, not yet reached by a botanist. Still further, Howley's geological map shows this band of limestones on the western border of the Long Range to extend for more than a hundred miles northward, cut into at their eastern ends by the antler-like arms of the bays and inlets—all unexplored! Hannah's Head, coincident with its change of name to Mt. Patricia, verily stands out as a princess among Newfoundland headlands.

In 1898, the late Rev. Arthur C. Waghorne, most active of resident botanical explorers, collected in woods at McIver's Cove, near the northern entrance to Humber Arm, an extraordinary willow. The fragmentary specimen in the Gray Herbarium has proved baffling to everyone who has tried to place it with any recognized species. It has been unsatisfactorily placed with *Salix phylicifolia*, *S. Barclayi* Anderss., *S. Barclayi* subsp. *latiuscula* Anderss. and *S. discolor*, but it differs from all of them in some very important characters (to be discussed in Part III). We were anxious to rediscover it and to secure abundant material; but on the day set a strong wind came up and it was necessary to wait until the calm of late afternoon. When we got to McIver's Cove we found that the older people well remembered Waghorne and his visit there; but no one in the village had ever seen or heard of a *wild* willow. They had plenty of *S. viminalis* planted, but they were so thrilled at the idea of a willow being really *native* in their cove that a good proportion of the population joined

[1] RHODORA, xxviii. 235 (1927).

in the search. In three or more parties we scoured the region until darkness (about 10:30) cut the search short; but when we left we agreed with the statement given us on first landing, that at present no native willow grows at McIver's Cove.

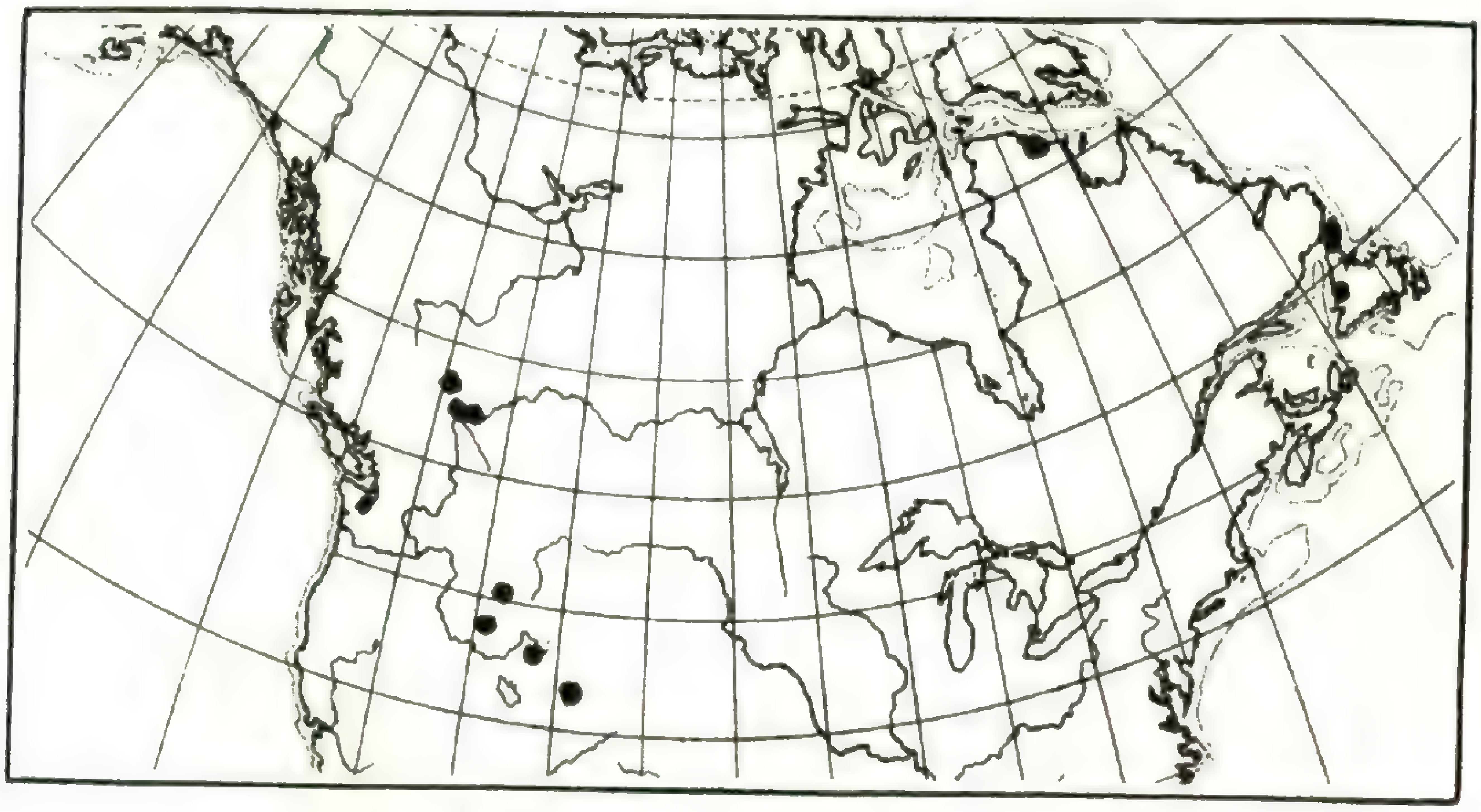
Mr. James Pennell, whose extensive grounds at Curling contain many interesting garden plants, showed us a handsome shrub which he and his father had transplanted from a thicket at Hugh's Brook. The shrub is *Crataegus laurentiana* Sargent; and, since any native *Crataegus* is rare in Newfoundland, we were glad to see it. Heretofore our only stations for the species had been on the banks of the Exploits.

Mr. S. Wheeler, a merchant at Curling, who had had much experience as a mine-prospector in the West and who intimately knows the mountains and the different rock-outcrops about the Bay of Islands, wanted us to see the Middle Arm. We and others before us had seen much of the Humber Arm, and Long and Fogg had seen the dreary serpentine wall of the North Arm, but we had never visited the Middle Arm. In imitation of the charity-supported but rapidly breeding "fishermen" we had once encountered farther north, who, content with their dole, argued "There are no fish, so what's the use of going out?", we should have repudiated the proposition a day or two earlier. But in the meantime we had been introduced to Hannah's Head, and nothing but the now undesired arrival of the "Sagona" would keep us from making the trip.

Mr. Wheeler was obliged to close his store for the day; the trip from Curling to Middle Arm Point, thence in to the head of Goose Arm or of Penguin Arm and back to Curling, would take much of the day (more than fifty miles, all told). He, therefore, invited us to breakfast with him in the early morning and to allow him to take coffee pot, frying pan and food for the trip; and on July 16, with Mr. Wheeler as experienced guide, wise philosopher and genial friend, we went for an 18-hour trip to the Middle Arm. It was after midnight when we got back; our three large collecting boxes were quite inadequate for the specimens; and we had given a small portion of the Middle Arm only the most hasty "once over." Whereas Humber Arm has many villages and from Petrie's Point to Humbermouth is cleared and denuded by man and fire, the Middle Arm is not only almost uninhabited but is bordered on all sides by high unspoiled cliffs of fantastically twisted limestones and calcareous slates. The moment

we rounded Middle Arm Point we were anxious to land, but our wiser counsellor calmly replied: "We haven't got anywhere yet."

At Cutwater Head, however, he drew in under the steep talus. Scrambling ashore, we started up the loose slaty debris only to come sliding back to the starting point. One turfy and bushy island on the talus was finally reached and there we anchored by means of our botanizing picks, reassembled our lost breaths and looked about: the usual masses of *Hedysarum alpinum* L. with its ornamental pink racemes; silvery-bronze masses of glistening *Shepherdia canadensis*, everywhere common in western Newfoundland but always puzzling us in the distance by its varied lustre; *Salix vestita* Pursh, as lovely a willow as grows, with satiny-white under surfaces and dark green



Map 3. Range of Oxytropis foliolosa.

upper surfaces of the rounded leaves, the large terminal buds red or purple; the regular Saxifrages of such places; *Artemisia canadensis*, scarcely in flower and delicately fringe-like; and numberless other calciphiles of which we never tire. With time only for the briefest of collecting, we brought our eyes to our insular anchorage: *Oxytropis foliolosa* Hooker (map 3), the rare Rocky Mountain species with 1-sided racemes of royal-purple flowers, heretofore known in eastern America only from shores of Hudson Strait and of the Straits of Belle Isle; *Astragalus eucosmus*, at our first station in western Newfoundland from south of Pistolet Bay; the most gigantic of Dandelions, a species of *Taraxacum* which we already knew from the Straits of Belle Isle,

the Mingan Islands and Anticosti, with extraordinarily large involucres, apparently an undescribed species (to be described and illustrated in Part III). Here, as on the other taluses we visited, *Primula laurentiana* Fern. and the more delicate *P. mistassinica* abounded, as did the subarctic *Festuca rubra* var. *arenaria* (Osbeck) Fries, *Parnassia parviflora*, and other less significant species. We wanted to search further, for we had collected only from a stranded bit of turfy carpet, and the talus and cliffs of Cutwater Head cover a vast area; but a gentle, though authoritative, "We haven't got anywhere yet" brought us back to the motor boat.

The western slope of Penguin Head looked so interesting that we spent a full hour there; then, rounding the point, we landed on a very different slope, merely the eastern dome of the same Head. Finally, after a few minutes on Druid's or Raglan Head and alluring glimpses up Penguin Arm and Goose Arm, with their unvisited limestone walls, we turned back, regretting the "Sagona" and the obligation to catch her. At ten o'clock Mr. Wheeler further tantalized us by stopping under the big cliffs at Cod Cove. It was twilight but we could see the big-headed *Taraxacum* again, though it was too dark to tackle the slippery wall. With this diverting background, we "boiled the kettle" and our day's botanizing was over: acres of "Limestone Polypody," *Thelypteris Robertiana; Kobresia simpliciuscula* (Wahlenb.) Mackenz., as fine as we had ever seen; *Carex rupestris* All., not previously known from the Bay; the arctic *Potentilla nivea* L. and *Dryas integrifolia* Vahl; *Rhododendron lapponicum* (see comment on p. 10); *Solidago multiradiata* Ait., the most northern of American goldenrods; one of the new brown-headed species of *Antennaria* (PLATE 265) of Hannah's Head and another (PLATE 268), very beautiful, with 1 or 2 white heads, a plant we had never before seen in Newfoundland; and the Newfoundland phase of *Arnica chionopappa* Fern. which Rydberg has dignified with the name *A. Fernaldii.*

At the opening of the week we had keenly regretted the necessity of waiting at much-botanized Bay of Islands; now we almost resented our promise to our hosts at Old Port au Choix to arrive on the next trip of the "Sagona." Only a very limited area about the Bay of Islands has really been closely botanized; we could spend a whole season with a center there, and then not exhaust the rich areas. We can't do it all. Most fascinating exploration awaits the right party; but, to do effective work they must be able to climb and they

should not waste time and strength on the "taboo-list" of ubiquitous and unsignificant plants!

We reached Old Port au Choix soon after sunrise on July 19th, planning to secure the desired *Salix* and anything else overlooked by Bachelot de Pylaie in 1820 and by Wiegand, when he barely reached Pointe Riche from the south in 1910; then to be taken over to St. John's Island for the *Taraxacum;* and, finally, to catch the "Sagona" three days later on her trip south. On July 28th I wrote Mr. C. A. Weatherby a letter from which I excerpt passages which intimate why we were still at Old Port au Choix.

"Finally, the Sagona sailed on the 17th. On board were Mr. and Mrs. Morris, en route to Flower Cove, thence 48 miles by motor boat to Cook's Harbor to photograph *Habenaria straminea!* They had been waiting *ten* days at a neighboring village without knowing where to botanize; and we were all naturally aggrieved that we hadn't joined company for some of the real botanizing.

"We had selected Old Port au Choix for a short visit partly because the horizontal limestones of northwestern Newfoundland here come to the surface [PLATE 234] along every cove, forming extensive gravel (angular and very sharp)-covered barrens [PLATE 235] for miles around. Looking out our windows we see bare crests in all directions, and on the points (or 'heads') high cliffs with *very* high talus. The village occupies a narrow isthmus (perhaps ¼ mile across) [PLATE 235] between St. John Bay at the north and Ingornachoix Bay at the south, so that motor boats can be taken in either direction, without having to go many miles around Pointe Riche. Back of us to the north, with its southern edge 10 miles away, lies the range called The Doctor Hill, and beyond that, to the north, its mate, Bard Harbor Hill, where we got so many fine things four years ago.

"The people of Port au Choix (two miles away) and Old Port au Choix are the most intelligent and modern of any we have been thrown with in the 'outports.' The 'agent' (manager of fishing, etc.) is an interesting man, and our hosts, Stanley Lavers and his wife (*née* Breton) are a splendid pair. Mrs. Lavers had French parents, which is a salvation to our digestions. At most places in Newfoundland we get the horrible English cooking, gone a few degrees worse: boiled potatoes, brassicaceous vegetables (if any) and poor bread and soggy steamed puddings. But here we find a big house, with

three large spare rooms, a fine garden, cream-giving cows, plenty of eggs and poultry; and we live high—salmon, fresh cod, halibut, lobster, rabbit, poultry, cream that stands up in mounds (served on almost everything, including lobster), lettuce, carrots and greens! How can we ever get into training for mountain-climbing? Mrs. Lavers quickly recognized our dislike of grease and she boils, steams, bakes or broils everything; we are so satisfied with our home and our splendid food that we have eliminated some other projected areas and are staying on and on. This, however, is not botanically disadvantageous, for every day we bring in one or more 'n. sp.' or species 'new to Newfoundland.' Our 'laboratory' is the adjacent store of Narcisse Breton, a general store now going out of business, so that there is only a meagre remnant of stock on the shelves and we have only 1–5 purchasers visit us daily! Instead, the shelves are stacked with driers, ventilators, etc., and we put up our specimens on the counters. The visitors come for impossible purchases and then linger to comment on the beauty of our 'flowers' and they gladly give us the local names for the showy ones.

"The weather has been perfect, clear and rainless through the day, with showers in the night; consequently, we have been embarrassed by full presses and the temptation to go daily to a new headland or prairie-like barren, working three or four hours after supper putting things into press. I brought 1000 driers but we need twice as many and have to shift and manipulate to get out enough to put up each day's collecting; and, at that, we prepared a 'taboo-list' of a hundred or more species too generally distributed to collect. *Antennaria* and *Arnica* occupy much of the time. We have, I suppose, fifteen species of *Antennaria* collected in large quantity, at least five of them new species, some very peculiar, and several previously known only from the type locality many miles away. Everywhere we go *Arnica Fernaldii* Rydb. is seen, but always scattered; similarly *A. terrae-novae* [PLATE 270] and another (the handsomest of the group [PLATE 269] with stiffly erect fuzzy leaves [*A. tomentosa* J. M. Macoun]) are scattered all about. But on one side of one peninsula we came across a freely stoloniferous little species (*A. Griscomi* of the Shickshocks), making solid carpets on the turfy slopes and looking like our lawns of dandelions. And speaking of *Taraxacum*, that genus is in full swing, with many very different species.

"We very promptly came upon *Habenaria straminea* all about us—

the deliciously vanilla-scented species Morris has gone so far to photograph! He may be returning south on the 'Sagona' this afternoon or tomorrow morning and I haven't the heart to break the news to him. Nor do I know whether to disconcert his plans by showing him another *Habenaria*. In 1820 Bachelot de la Pylaie spent eight days about Ingornachoix Bay and in his 'Voyage' he spoke of finding *Platanthera bifolia* of Europe. His record has always been discredited; but last Sunday, while Long was at home writing the weekly letters, Fogg and I took a stroll before supper (with our eyes shut, for it was Sunday) and in the heath-barren (*Empetrum*, *Dryas* and *Juniperus*) found a yellowish-flowered *Hab.* with two basal leaves, presumably what De la Pylaie had seen, though not really *H. bifolia*. Subsequently we have collected four other numbers of it and now pass it by—all in dry limestone barren.

"From my place at table I look out on a fine cliff a mile away, but one has to go there to learn that its crest is covered with two tiny arctic *Carices* [PLATE 247] quite new to us; and so it goes. Nineteen years ago Wiegand got a sterile branch of a strange willow at Pointe Riche. It has been recognized by both Schneider and me as a very distinct new species, but the material is wholly inadequate. It was that which really decided us on coming here—over one boat. We now have a beautiful series [PLATE 254], a handsome species nearest *S. lanata* of Lapland and Scotland. . . . I won't try to list all the hundreds of plants of real interest. It is a vast country and we have to omit 99% of it."

Nor in this supplementary account will I enumerate them all nor try to give the daily discoveries with exact chronology. As stated in the letter above quoted, it was impossible to go to a new stretch of open barren or to a new headland without adding to the novelties discovered. *Antennaria*, which we thought we had already well collected, was as thrilling as ever; one plant, abundant hereabouts, forming broad rosettes and having the brown heads with almost gamophyllous involucres (PLATE 264)—enough, except that in everything else it is a perfectly good *Antennaria*, to throw it out of the genus!; another, forming little barrel-shaped or columnar plants (PLATE 263) with an amazing number of cauline leaves; others, old friends, such as the very rare *A. Wiegandii* Fern. which we discovered four years earlier on St. John's Island, or the widest-spread species in Newfoundland, the green-leaved and white-headed *A. spathulata* Fern. But, since the

Limestone barrens, Old Port au Choix (upper).
Limestone barren, St. John Island (lower).

Terraces, southern slope of Doctor Hill (upper).
Unremoved Angular Blocks, tableland of Doctor Hill (lower).

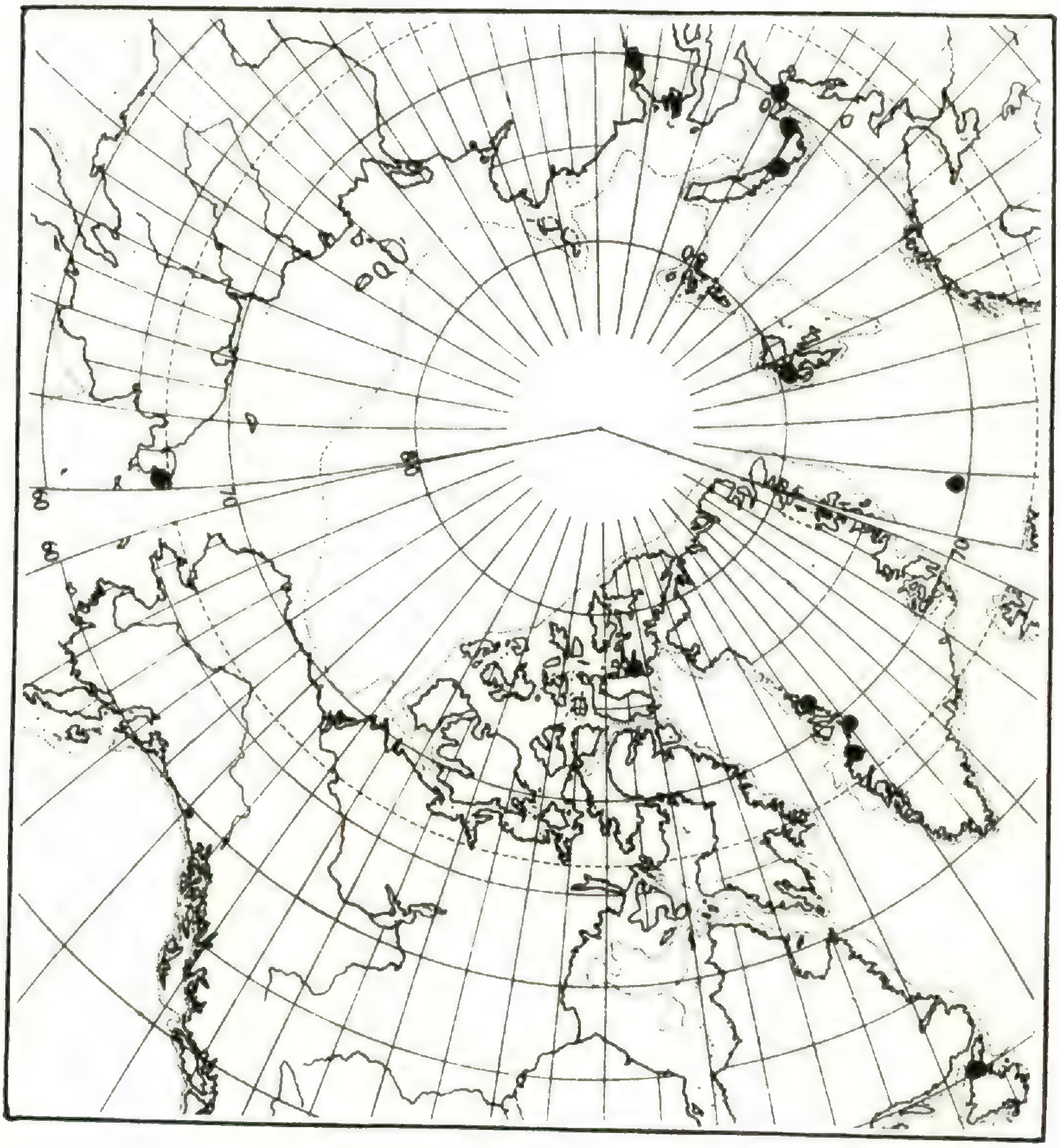
genus *Antennaria* in Newfoundland will be specially treated in Part III, it need not receive further attention here. *Arnica*, too, has been sufficiently discussed for the present. In general, the dry barrens and open slopes were carpeted with a fine assemblage of willows, all of them well known from western Newfoundland (except the new species related to *Salix lanata*), but enough to make a New Englander take notice: *S. reticulata* L., *vestita* Pursh, *Uva-ursi, arctophila* Cockerell, *cordifolia* Pursh (in great variety), *calcicola* Fernald & Wiegand and *candida*. In one depression on Pointe Riche *S. pedunculata* Fern., a large shrub with great aments nearly a decimeter long and previously known only from near the Straits of Belle Isle, made an extensive thicket.

On the dry barrens (PLATE 235) it was impossible to predict what would appear next. *Agrostis paludosa* Scribn., here as elsewhere inclined to belie its name, seems to be pretty clearly a variety of *A. borealis* (to be discussed in Part III). *Scirpus rufus*, which we had always considered a strict halophyte, here ran well back into the barrens, where it mingled with *Carex glacialis* Mackenz. and the always puzzling Drabas or with various forms of *Calamagrostis inexpansa* and the baffling forms of *Agropyron*.

In the letter above quoted reference was made to two tiny arctic *Carices;* they grew together on the dry barren back of Gargamelle Cove. One, the tiniest *Carex* I know, except the arctic *C. ursina* Dewey and *C. glacialis*, proves to be the high-arctic *C. incurva* var. *setina* (Christ) Kükenth. (PLATE 246, MAP 4), originally described from arctic Siberia, but now known also from Spitzbergen, Jan Mayen, western Greenland and Ellesmereland. Here, in latitude 51°, it is at sea-level and its interlocking companion is a new species (PLATE 246) which has been elsewhere found only in Greenland (to be discussed and illustrated in Part III).

Comandra Richardsiana was splendidly flowering and the *Lesquerella* of western Newfoundland and Anticosti (PLATE 258), which has been passing as the arctic *L. arctica* (Wormskj.) Wats. or as its var. *Purshii* Wats., was scattered in the dry shingle. Abundant new collections from Newfoundland and beautiful material of *L. arctica* recently received from Dr. Morten Porsild strengthen the conviction that our plant is not *L. arctica;* this matter will be further discussed in Part III. The little Tansy of northwestern Newfoundland, *Tanacetum huronense* var. *terrae-novae* Fern., crept through the

gravel, forming beautiful white plumes of foliage, with great golden buttons of flowers; and the monotony of ubiquitous but always beautiful *Dryas integrifolia* was occasionally broken by patches (mostly sterile) of the white-pubescent var. *canescens* Simmons, described from Ellesmereland but already known on Table Mt. at



Map 4. Range of Carex incurva, var. setina.

Port au Port. In one dry thicket I was pleased to greet *Amelanchier Fernaldii* Wieg., a northern extension of range; and on one strip of gravel on Pointe Riche we came across *Campanula rotundifolia* displaying every conceivable variation from the common linear-

leaved extreme to others with oblong or even narrowly ovate cauline leaves, the latter var. *alaskana* Gray.

So much for some of the plants of dry barrens. Where it was slightly less dry, in humus-carpets or in depressions, *Habenaria straminea* Fern. (PLATE 251) abounded. The other *Habenaria* (PLATE 252), about which I wrote Weatherby, proves to be an extreme variation of the continental *H. Hookeri* of acid peats of woodlands, in northwestern Newfoundland known only in open limestone barrens. Its behavior is quite as reprehensible as that of *H. orbiculata*, discussed on p. 8. Another Newfoundland orchid, *Cypripedium parviflorum* var. *planipetalum* Fern. (PLATE 250), abounded in the peaty spots, very handsome and strikingly unlike the continental plant in its short and broad flat petals.

In a single unusually wet depression (wet enough to have standing water) on Pointe Riche the very rare and most distinct *Drosera linearis* made almost continuous turf. In Newfoundland we had previously known it only on the serpentine or magnesian limestone of Blomidon. In such places, also, *Carex bicolor* All. and *C. microglochin* Wahlenb. abound; and it is here that we look for *Epilobium davuricum* Fisch. and *Juncus albescens* (Lange) Fern. (PLATE 249). The latter species takes the place in northern North America of the European *J. triglumis* L., but, since the distinctions have only recently been pointed out (RHODORA, xxvi. 202), it is desirable to illustrate them.

The visit to Bard Harbor Hill and to Doctor Hill in 1925 had yielded so many good things that we wanted to get back to the mountains, especially to try the southern and eastern portion of Doctor Hill. So, with Mr. John Lavers as guide and aided by Mr. Allan Ofrey, we left the latter's place at Eddy's Cove on St. John Bay (Old Man's Cove of the charts) on the morning of July 30th and packed in to the southern slope of Doctor Hill, which on this side presents wonderfully accentuated terraces (PLATE 236) in the hard quartzite rock. Camp was established near timber-line on Deep Gulch and in the afternoon the first botanizing began. Deep Gulch, like the gulches on the northwest side of Doctor Hill and on Bard Harbor Hill, explored in 1925, has precipitous walls of thoroughly rotted rock and so does the next gulch to the west, the head of Yellow Brook. It was positively dangerous to climb far out on these walls, for great blocks would suddenly break out and go bounding down the ravine, to start others and, perhaps, an avalanche. Botanically Deep Gulch and Yellow

Brook were very similar to Deer Pond Gulch and Northwest Gulch on Bard Harbor Hill. Thickets of *Vaccinium ovalifolium* Sm. in young fruit and of *V. nubigenum* Fern. (PLATE 260) in young flower covered many dry banks. The difference in flowering season is striking. Repeatedly in the Shickshock Mountains and on the Doctor Hills we have found the same situation: in many years of field-experience with *V. ovalifolium* I have never been early enough to see flowers, but *V. nubigenum* lingers and flowers by the snow-banks into August. *Poa laxa* hung in fringe-like lines from the crevices of the rock, particularly on one precipitous wall which we could never approach without stirring the solicitousness of an eagle which, fearful for the nest, circled continuously above us until we got into another fork of the gulch. *Viola palustris* was just flowering, as was *Epilobium lactiflorum* Hausskn., both very local in Newfoundland. The crimson-flowered *Streptopus oreopolus* Fern., abounded; and many places by the brookside, especially at the head of Yellow Brook, were bordered by as fine clumps of *Athyrium alpestre* as those on Deer Pond Brook and in the Northwest Gulch. The Newfoundland plant is, apparently, much nearer to the typical Eurasian plant than to the two varieties in continental America.[1] The gravels and rocks in the brook as it descended the terraces were beautifully carpeted with *Epilobium Hornemanni, Alchemilla vulgaris* var. *vestita* (Buser) Fern. & Wieg. and var. *filicaulis* (Buser) Fern. & Wieg., the blue-flowered *Veronica humifusa*, and other species delightful to see but already well known from the Doctor Hills. On broad flats along the brook, with *Angelica laurentiana* Fern.,[2] *Epilobium angustifolium* had extraordinarily broad leaves (elliptic and 4–6 cm. broad), the Alaskan var. *macrophyllum* (Hausskn.) Fern.,[3] heretofore known in the East only from the Magdalen Islands. About the heads of the gulches, where the heathy turf hung over from the terraces and the upper tableland, *Salix herbacea, Phyllodoce caerulea* and *Carex stylosa* C. A. Meyer, all rather localized species in Newfoundland, occur.

The open tableland (PLATE 236) itself was a disappointment, too dry for any but the most extreme xerophytes of any bleak and arid silicious summit. In a few places, where a damp sphagnous carpet occurred, the plants were the most ordinary of species of any wet peaty lowland in New England or even the Southeastern States. It

[1] RHODORA, xxx. 48, tt. 165, 166 (1928).
[2] RHODORA, xxviii. 222 (1926).
[3] RHODORA, xx. 4 (1918).

was not thrilling to collect *Osmunda cinnamomea, O. Claytoniana* and *Carex canescens.* We badgered Mr. Lavers to produce an alpine lake or at least a bog, but the best he could do was a slight depression in the midst of the dry lichen-crusted blocks of rock. Here were two variations of the lowland *Carex vesicaria:* var. *jejuna* Fern.; and another (PLATE 248), undescribed, with very long and broad purple scales. *C. lenticularis, C. brunnescens* and other uninteresting species were here, and one very striking sedge. This formed great hassocks or "nigger-heads," much like those of *Carex stricta,* standing as vertical columns a foot or more high and consisting of ropy interwoven dead roots (much suggesting a small tree-fern). The two inches at the summit were a thin and dense turf (living on the dead waste of its own past years) of short leaves and miniature culms (up to 4 cm. high), with purple spikes often only 2 mm. long, but sometimes up to 1 cm. or more. This looked like "something"; but the best I can do is to make it out a starved and overcrowded state of the most variable and least interesting of mountain *Carices, C. concolor* R. Br. (*C. rigida* Good., not Schrank). Somehow this meagre and uninteresting sedge seemed to epitomize the botanical status of the southern tableland of the Doctor Hills, a poor place when contrasted with Bard Harbor Hill and the calcareous northwest slope of Doctor Hill at John Kanes's Ladder.[1]

The boggy barrens ("barrns") and swales between Deep Gulch and Eddy's Cove had looked interesting, so, on the way out, we lingered at some of them. *Thelypteris cristata* (*Aspidium cristatum*) abounded in one of the swales, a real extension north; and the rather rare *Ranunculus Macounii* was abundant in swampy woods. *Epilobium nesophilum* Fern.,[2] a species of the region about the Gulf of St. Lawrence, abounded; and in one limy bog, where *Juncus stygius* var. *americanus* and *Parnassia parviflora* were abundant, we were amazed to find quantities of *Parnassia caroliniana,* quite new to Newfoundland.

The woods near the settlement at Eddy's Cove are terribly overrun by cattle, and almost none of the unspoiled forest-carpet remains. While Stanley Lavers and his father were packing the motor boat for the return to Old Port au Choix, Long, never through botanizing until the boat is leaving, crept on hands-and-knees among the ruined

[1] RHODORA, xxviii. 125, 126, t. 155 (1926).

[2] RHODORA, xxvii. 32 (1925).

and pastured knolls; and, when "all aboard" was shouted, he came half-beaming, half-reluctant, to the shore. For he held *Calypso bulbosa,* one of the rarer Newfoundland orchids, which the cattle had not wholly exterminated; and with it *Listera borealis* Morong, the northern cordilleran species which Marie-Victorin had been finding in the sea-shore spruce thickets of Anticosti and the Mingan Islands.

Long had but one individual of *Listera borealis* and he wanted another, for the agreement was that the *first* set of specimens should come to the Gray Herbarium! So, on August 5th we tried again. Some years ago Wiegand, Bartram and I were anxious to get upon our labels for the East Coast the localities, Lushe's Bight and Mosquito Bight, to say nothing of Come-by-Chance and Seldom-go-by; so, our party of 1929 having got into training by the mountain-trip, we now yearned to see our names on a label opposite the locality, Bustard Head. But, alas! no one seemed to have heard of the place and when we showed them our maps and charts they merely said, "Oh! Back Cove." Geographic nomenclature in Newfoundland follows neither the rule of strict priority nor established usage. The Highlands of St. John of all charts are now The Doctor Hills; Allan Ofrey lives at Eddy's Cove, but by the charts it is Old Man's Cove; the old Poverty Cove on the Straits is now Sandy Cove; the names of half the localities on our labels of 1910 are now obsolete, and in a few years our present labels may have become unintelligible!

Starting out on a real search for *Listera borealis,* we first landed on two islands at the entrance to Old Port au Choix, Savage's Island and Grassy Island. Both islands had the lushest of vegetation, but mostly the maritime species expected; and both were largely dominated by the gigantic *Angelica laurentiana* Fern., which grew in our dooryard on the mainland, but here made dense thickets. And both had the most beautiful *Carex incurva* Lightf. which could be imagined, great lawn-like slopes of it 2 dm. deep, with globose-ovoid heads more than a centimeter thick. *Arabis alpina* L. was dominant on Grassy Island and the beautiful sky-blue *Gentiana nesophila* Holm[1] occurred sparingly on Savage's; and nesting terns were greatly disturbed by our presence. We wanted to go on and examine the other islands in St. John Bay (it had been so rough or we had been so busy that we had not crossed to St. John's Island for the *Taraxacum*); but we had

[1] Holm, Ott. Nat. xv. 111, 180, t. 13, fig. 6 (1901).

started for Back (or Bustard) Cove and for Eddy's (or Old Man's) Cove for the *Listera.*

Fogg and I were landed at the former place and were to follow the shore for four miles to Allan Ofrey's; Long went on to renew the search at the original spot. Fogg and I had a beautiful day, but with no very important discoveries: *Parnassia caroliniana* again and, of course, fine colonies on the turfy shores of *Malaxis brachypoda* (Gray) Fern.,[1] the little American orchid which has been mistaken for the European *M. monophyllos* (L.) Sw. *M. brachypoda* is probably more abundant in the limy region of northwestern Newfoundland than anywhere else; and, since doubt of its specific distinctness has been raised, it seems desirable to show the contrasts photographically (as PLATE 253).

Reaching Allan Ofrey's little house (a tiny house with a large family) in the late afternoon we were met by Long. We all had the same sad report: no *Listera borealis.* He and the cows before him had got it all; but we optimistically feel that another year (especially in July, instead of in August) it will be found in quantity. Accepting the cordial invitation of Allan and Mrs. Ofrey to have tea with them, we hailed the waiting boat crew and all hands crowded into the little kitchen and enjoyed such a delicious feast of lobster, lettuce, cream and hot biscuit as we shall never forget; but, while eating the rich cream, we could not help mourning that we were not getting *Listera borealis* and *Calypso* in undigested form. Then we went out to the canning shed, where we were given an explanation of up-to-date lobster canning, with all its carefully inspected details of disinfection. Then nothing would do but that we must have our pockets filled with cans of freshly put-up lobster!

The hearty cordiality and unspoiled enthusiasm of the Newfoundland fisherman, once the ice is broken and the restraint of diffidence removed, is proverbial. On this trip, as on a previous one, we had heard much of the great botanical promise of the distant Rubbly Hills. So, when we asked Allan if, some year after the lobster season is past, he could guide us to the Rubbly Hills and to give us an idea of the expense, we were gratified and not at all surprised by the answer: "Shure, I'll go wid yez. D'ere's nuttin' I loves so much as trabbelin' ober de country, and I always likes to go wid fonny folks. I've got me motor boat; dat don't cost nuttin'. I've got plenty of lobster

[1] RHODORA, xxviii. 176 (1926).

and rabbit; dey don't cost nuttin'. We may have to borrow a dory; dat don't cost nuttin.' Den w'en we comes out you might give me a little somet'n if you feels like it." It has been a real grief that, as yet, we haven't been able to carry through so promising a trip to the Rubbly Hills.

There was plenty more to do; but we felt that, in the interest of fair play, we ought to leave something for others to discover, and that, in the interest of science, it would be well to see wholly new territory.

No answers had come to my inquiries for appropriate headquarters at Trout River and at Fox Island River (coming off the Lewis Hills), and on the "Sagona" Constable Bussey and Mr. Jenkins (one of the political pillars of the West Coast) had sorely tempted us by telling of the fine home and kindly hospitality of Mr. W. A. Preble at Woody Point in Bonne Bay. Bonne Bay had been visited by Wiegand in 1910 but only slightly explored, since his companion at that time became ill and Wiegand was forced to work alone. At two different times former students of mine had spent periods there, but, with no previous knowledge of the flora, they had inevitably been unable to discriminate between the interesting and the uninteresting, and they, naturally, did not know how to tell the really promising spots. From various trips on the steamer into the Bay, ranked as the most picturesque inlet south of northern Labrador, we felt that there must be good and quite novel botanizing there. That was what we were after.

So, early in the evening of August 7th, limp and dejected after a very pitchy voyage, we landed at Woody Point. The Preble mansion, outstanding for its architectural superiority and its beautiful garden with rows of fruiting strawberries and raspberries, was a landmark; and we promptly invited ourselves to be the guests of Mr. and Mrs. Preble. The genial and kindly owner did not see the matter from our viewpoint, however: the daughters had gone to Boston whence their grandfather, the late Dr. Preble, had originally come to Bonne Bay as surgeon for a Yankee fishing concern, and Mrs. Preble had no household help; all the travellers stopped at Mrs. Crocker's. Mr. and Mrs. Crocker together peeped out at us through the crack of a slightly opened door and explained that they never take boarders; besides, Mrs. Crocker had a hard cold and must not take on extra work. It was necessary to play a trump card; so I asked if she had seen a doctor and suggested that some of the medicines in our outfit

might help her. The effect was instantaneous: "Come right in. The right man in the right place!" Thus we found a home at Bonne Bay and soon monopolized Mr. Crocker's carpenter-shop and work-benches as our own.

Like the Bay of Islands, Bonne Bay has three main Arms and, like the names of localities on the Bay of Islands, the names on the charts and maps have little or no reflection in local usage. Woody Point (PLATE 237)[1] lies under the sombre, green, eastern slope of Lookout Mountain, at the southern entrance to what the charts call the "South Arm," but by the inhabitants known as "West Arm"; the finest botanizing is on the limestone cliffs which shut in the south side of "Main Arm" (called on the charts "East Arm);" while to the north-west of Main Arm there extends a slender branch of the antler-like Bay, locally, and to us inexplicably, known as "East Arm," but on the charts called "Deer Arm."[2]

(To be continued)

PYLAIELLA FULVESCENS (SCHOUSB.) BORNET.—I beg leave to report the presence on our coast of a peculiar form of *Pylaiella*. In essential respects it compares closely with the descriptions and figures of the species named above as given in De Toni's Sylloge Algarum, vol. III., p. 536 and in F. Börgesen's Marine Algae of the Danish West Indies Vol. II., pp. 431–433 and figs. 408 and 409.

I may mention the following distinctive characteristics: (a) the cells often contain peculiar stellate protoplasmic masses, similar to those in *Zygnema*, with the nucleus in or near the center; (b) several short, rhizoidal branches, about 11–16 μ thick, arise from many of the vegetative cells which are 30–35 μ broad; (c) most of the unilocular

[1] For the use of the picture, showing The Tableland covered in June with snow, I am indebted to SAMUEL D. GRANT, Esq. of Trinity and Blanc Sablon.

[2] I could not help recalling my first encounter with Newfoundland geographic usages. Alfred Kidder (the archaeologist) and I were about to start from Birchy Cove (now called Curling) on a canoe-trip, with Harry MacWhirter as guide, across the Island, by way of the East Branch of the Humber. Harry's directions, as I now remember them (the lapse of a quarter-century may have obscured the names), were: "Ship the canoe and heavy stuff on the freight; bill it to MacGreggor and tell the conductor to put it off at Sandy Lake. Then, next day, we will go on the express. Buy tickets to Howley and ask the conductor to let us off at Goose Ponds." We were properly mystified but followed directions, though, next day, when the train stopped at a lonely platform, marked "Avateer," and we alighted beside our camp-equipment and canoe, our understanding had become further perplexed. The whole situation was promptly cleared by Harry's explanation: "Why, you see it is this way: this place belonged to Pratt in St. John's and then he sold it to Baggs Brothers!"

sporangia are thick-walled and binate, because they are divided by a longitudinal septum. All the above structures except (c) are peculiar to *P. fulvescens* and are never found in our indigenous species. Nor is it altogether strange that this form should be abiding in our waters. Two small specimens have been found in the waters of the Virgin Islands; it is at home along the coasts of Spain, Southern France and the Canary Islands; and also along Morocco, where it received its first notice before the middle of the 19th century.

The single specimen to which this note refers, was found growing on *Fucus*, along an exposed shore at North Brooklin, Maine, on August 20th, 1932 and has been deposited in the National Herbarium.

Collins and Hervey in their Algae of Bermuda, p. 68, report a single collection on rocks from St. David's in May, 1913, by Hervey. This was distributed in the *Phycotheca Boreali-Americana* as No. 2076. But so far as I can learn, only the three small specimens listed above have ever been found in the waters of the United States.

It would seem that this may be a species in process of evolution. The stellate protoplasmic bodies and the binate sporangia are not universal. Only the Rhizoclonium-like appendages appear as a constant character, and even these are not always abundant. In the California specimens of *P. littoralis*, our common species, are found occasional forms with longitudinal septa (see the publications of Setchell and Gardner). And in the latter part of this summer, I collected on woodwork in this harbor, specimens of *P. littoralis* which showed this peculiar characteristic. I may be pardoned for adding that this is the first recorded instance of this abnormality in the waters of either Europe or Eastern North America.—R. E. Schuh, Brooklin, Maine.

Calamagrostis epigejos, var. georgica in America.—In 1928 I published as a new species *Calamagrostis arenicola* Rhodora, xxx. 203. The colony was in a sandy opening in woods at Harwich on Cape Cod "in precarious surroundings, with the railroad to Provincetown bounding one side, a wagon-road bounding another, and two summer cottages casting their shade upon it." Very soon after the publication of *C. arenicola* I received from Mr. Bayard Long material of a closely similar plant which had appeared a few years earlier as a novel and spontaneous colony in woods at Elkins Park in

Montgomery County, Pennsylvania. Very recently Mr. Long has written me: "I can confidently say that it is *weedy* and is a comparatively recent arrival in the woods where it occurs here. I used to know this spot so intimately that it is hard to believe that so conspicuous a grass could have been there then. At one time, some years ago, the dead chestnuts were cleared out and the place more or less cleared up. How much before 1924 it may have arrived one can only conjecture, but *arrive* it did I feel sure. When I last saw it, it had spread considerably."

In August, 1930, Mr. C. A. Weatherby detected on the higher portions of a salt marsh at Gloucester, Massachusetts, another colony of the plant, in a semi-natural, semi-disturbed habitat. Both the Elkins Park and the Gloucester material look exactly like the Harwich plant in having the panicle more slender and stricter and with whiter-brown spikelets with shorter glumes and lemmas than in typical Eurasian and African *Calamagrostis epigejos* (L.) Roth; but the Harwich colony, which I have had under observation for five years, shows every indication of being an introduction, spreading rapidly and in a *weedy* fashion, just as at Elkins Park.

In the Harwich plant the awn is inserted much lower on the lemma than in typical *C. epigejos*, but in the plants from Elkins Park and from Gloucester it is higher up, although in their very whitish and small spikelets and in the slender panicle the three colonies seem identical. In view of the apparent recent arrival and the weedy propensity of the three colonies it seemed important to search again in the Old World material. In the covers of *C. epigejos*, fortunately, I find one sheet from southern Russia which closely matches the problematic American plant and another from southern Moravia which is very close to them in most details. These and the recent arrival in Massachusetts and Pennsylvania seem, without question, to be C. EPIGEJOS, var. GEORGICA (C. Koch) Ledeb. Fl. Ross. iv. 433 (1853), based on *C. georgica* C. Koch, Linnaea, xxi. 387 (1848), coming originally from "provinciis caucasicis pr. Tiflis!" and differing from the greener or bronzy *C. epigejos* in "panicula pallida, arista paullo infra dorsum medium floris inserta." That a plant so localized in Eurasia should suddenly and almost contemporaneously appear in three remote areas of America is itself extraordinary; that it should come from an area whence we have derived few, if any, weeds in the past is equally noteworthy.—M. L. FERNALD.

Cynoglossum amabile in Massachusetts.—Although publication of the occurrence of a new weed or a casual garden escape, as one's chief contribution to literature, suggests the ebb tide of botanical activity, such records are desirable, as foreign plants often become an established part of a regional flora.

While exploring the West Chop section of Marthas Vineyard, Massachusetts, in the fall of 1932, the writer noticed a group of rough, blue-flowered plants growing in the low, waste ground of a clearing in the woods. Characteristics of the family *Boraginaceae* were clear, but the plant did not seem to fit the manual description of any native or generally introduced species. A specimen was submitted to Mr. C. A. Weatherby, of the Gray Herbarium, who immediately pronounced it a Cynoglossum, later determining it to be *Cynoglossum amabile* Staph & Hammond, a native of southwestern China.

This Chinese Forget-me-not is well known to florists as a garden plant, but this appears to be the first record as an established escape in North America. Doubtless the garden refuse from a neighboring estate was dumped in the clearing, and this sturdy growth of a dozen or more plants followed.—S. N. F. Sanford, Boston Society of Natural History.

Color Variation in a Missouri Colony of Hepatica acutiloba.—In those species in which there is a marked variation in the color of the flower, it would be interesting to know if this variation is correlated in any way with the distribution of the species. Hepatica is a promising genus for such study since large numbers of individuals often occur together on a single hillside and a color census can be taken very quickly. *Hepatica acutiloba* is found in varying shades of blue and pink as well as white. Like Mr. Weatherby,[1] I have found that a variation in exposure may change the flower color from a bright pink to an almost pure white. I have never, however, found a blue to be changed to a pink or vice versa. In Missouri, *H. acutiloba* is near the south-western limit of its range and large colonies of individuals are seldom met with. Near the "narrows" of the Big River, near Eureka, Missouri, there is however a colony of several hundred plants in one of the deep ravines of that region. On March 14, 1931 a color census was taken of the 74 plants

[1] Weatherby, C. A., Rhodora 27: 131–132.

then in flower. No pure white-flowered plants were found. Those which at first seemed to be white were found upon closer examination to have traces of pink in half-opened buds. Notes were taken as to the number of involucral bracts and the number of sepals as well as on the variation in flower color. No variation in bract number was found; all 74 plants had three per flower. Sepal number varied from 6 to 9 and there was no obvious relationship between sepal number and color. There was considerable variation in sepal shape and bract shape, the extremes of which are shown in the accompanying figures.

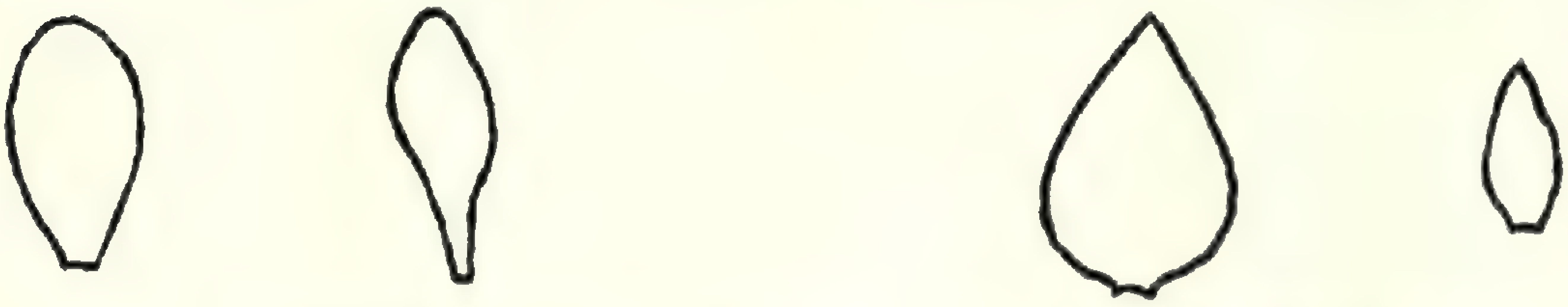


Fig. 1. Extremes in shape of Sepals (left); and of Bracts (right); all × 1.

There were in all 48 pink-flowered plants and 26 blue-flowered ones. Two of the former had a slight tinge of blue and might perhaps have been scored as intermediate in shade. These results are summarized in the accompanying tables.

	white, color showing only in bud	faint color	deep color	total
pink	16	24	8	48
blue	0	13	13	26

	6 sepals	7 sepals	8 sepals	9 sepals
pink	32	14	2	0
blue	21	2	2	1

Taken by themselves, these results are perhaps hardly worth reporting. When compared with counts from other localities or with the results of breeding tests, they may prove to be of more importance. I shall be glad to serve as a clearing house for information collected at other points.

Since the Narrows of the Big River has been repeatedly visited by St. Louis collectors, no herbarium specimens were made. The following collections have been made in the very close vicinity:

Allenton, Mo., April 1887, *Letterman* (MBG); April 10, 1884, *J. H. Kellogg* (MBG); woods on Bat Rock, Jefferson Co., April 2, 1899, *H. Eggert* (MBG.)—Edgar Anderson, Arnold Arboretum.

Panicum dichotomiflorum, var. puritanorum in New Hampshire.—On August 30, 1930, Professor Philip A. Munz and I, with our respective families, picnicked pleasantly on the banks of a small sand-plain pond in the township of Nashua, New Hampshire. Its strand was covered with an abundant vegetation, composed of such pond-shore-loving species as *Cyperus dentatus, Eleocharis olivacea, Fimbristylis autumnalis* and *Juncus pelocarpus.* A representative set was taken for the herbarium of the New England Botanical Club, but, because of various mischances, the specimens lay untouched until last fall (1932). When they were taken out for labelling, there was found among them a grass which, on examination, proves to be *Panicum dichotomiflorum,* var. *puritanorum* Svenson. The material is quite typical, in its short, blunt spikelets matching excellently Dr. Svenson's illustration and his type specimen.

When this variety was described (Rhodora xxii. 154 (1920)), it was known only from Cape Cod, though transitional specimens from the sand-plains of the Connecticut River valley were noted. It has since been reported by J. F. Collins (Rhodora xxx. 231 (1928)) from South Kingstown, Rhode Island, a region in which many species of the coastal plain occur; and in a letter of October 16th, 1930, Dr. A. S. Hitchcock states that he has at Washington specimens from Indiana and from New Jersey which appear to belong to it.

The New Hampshire locality adds an additional state to the range of the variety and one more to the select company of coastal plain plants which are found at isolated outposts in that state.—C. A. Weatherby, Gray Herbarium.

Volume 35, no. 409, including pages 1 to 40 and 2 plates, was issued 6 January, 1933.

The Tableland and Woody Point, Bonne Bay, in June
(Photograph by *S. D. Grant*).
Diorite Pinnacles, Western Head, Bonne Bay (lower).

MAR 1 1933

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB

Conducted and published for the Club, by

MERRITT LYNDON FERNALD, Editor-in-Chief

JAMES FRANKLIN COLLINS
CHARLES ALFRED WEATHERBY } Associate Editors
LUDLOW GRISCOM

Vol. 35. March, 1933. No. 411.

CONTENTS:

Walter Deane. *C. A. Weatherby* 69

Recent Discoveries in the Newfoundland Flora (continued). *M. L. Fernald* 80

Ectocarpus paradoxus in New England. *R. E. Schuh* 107

Leavitt's Forest Trees of New England (Notice). *B. L. Robinson*. 108

Two Segregates in Sporobolus. *M. L. Fernald* 108

Some Synonymy. *T. D. A. Cockerell*. 110

The New England Botanical Club, Inc.

8 and 10 West King St., Lancaster, Pa.

Room 1001, 53 State St., Boston, Mass.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price, $2.00 per year, net, postpaid, in funds payable at par in United States currency in Boston; single copies (if available) 20 cents. Volumes 1–8 or some single numbers from them can be supplied only at advanced prices which will be furnished on application. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be considered for publication to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than two pages of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

M. L. FERNALD, 14 Hawthorn Street, Cambridge, Mass.

Subscriptions (making *all remittances* payable to RHODORA) to

Ludlow Griscom, 8 W. King St., Lancaster, Pa., or Museum of Comparative Zoology, Cambridge, Mass.

Entered at Lancaster, Pa. Post Office as Second Class Mail Matter.

INTELLIGENCER PRINTING COMPANY

Specialists in Scientific and Technical Publications

EIGHT WEST KING ST., LANCASTER, PA.

CARD-INDEX OF NEW GENERA, SPECIES AND VARIETIES OF AMERICAN PLANTS, 1885 TO DATE.

For American taxonomists and all students of American plants the most important supplement to the Index Kewensis, this catalogue in several ways exceeds the latter work in detail, since it lists not only the flowering plants, but ferns and other vascular cryptogams, and includes not merely genera and species, but likewise subspecies, varieties and forms. A work of reference invaluable for larger herbaria, leading libraries, academies of sciences, and other centers of botanical activity. Issued quarterly, at $22.50 per 1000 cards.

GRAY HERBARIUM of Harvard University,
Cambridge, Mass., U. S. A.

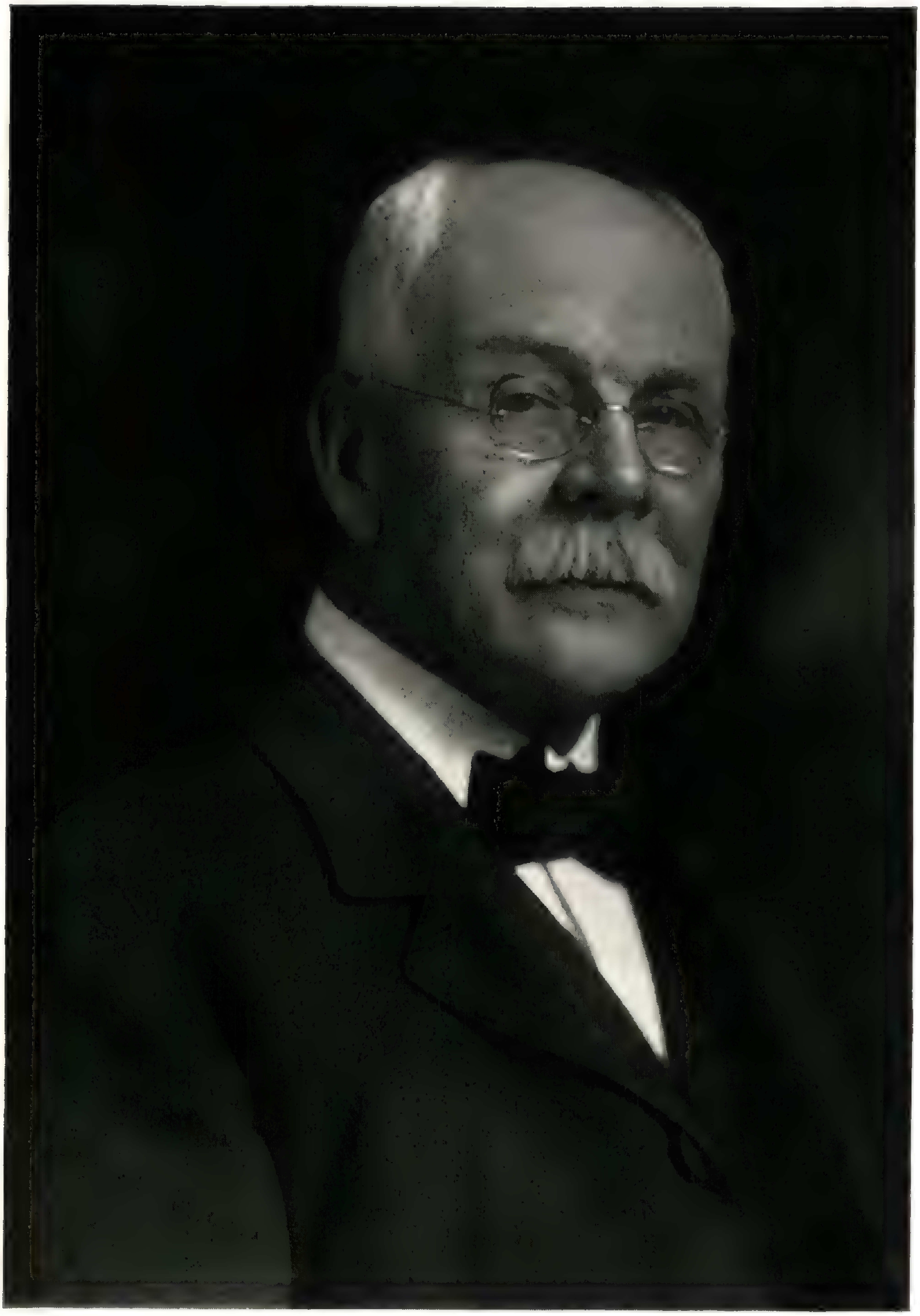
CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. DAY. Leatherette. Pocket size. Invaluable for collector's memoranda and herbarium records. Published and sold by the GRAY HERBARIUM, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

MEMOIRS OF THE GRAY HERBARIUM. A series of illustrated quarto papers issued at irregular intervals, sold separately.

No. III. The Linear-leaved North American Species of Potamogeton, Section Axillares, by M. L. Fernald. 183 pp., 40 plates, 31 maps. 1932. $3.00.

Gray Herbarium of Harvard University, Cambridge, Mass.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3/4 in. 1 year $4.00, 6 months $2.50.



Sincerely
Walter Deane

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 35. March, 1933. No. 411.

WALTER DEANE

C. A. Weatherby

(*With portrait*)

With the death of Walter Deane, a gracious figure passed from among New England botanists. Kindly, cordial, full of a perennially youthful and eager interest in all the doings of mankind, he possessed a lovableness which it is given to few of us to attain. Whatever his accomplishments otherwise were or might have been, it is the appealing personal quality of the man which inevitably comes first to mind as one thinks of him.

Deane was born in what his father called "a pretty little house" in Edinboro St., Boston, April 23, 1848, the son of Charles and Helen Elizabeth (Waterston) Deane, and the fourth of a family of six which remained unbroken by death until all were past seventy. On his father's side he came of old English stock; the original American ancestor, also Walter, was one of the first settlers of the town of Taunton, Massachusetts. The line was one of preachers and physicians. His mother was the daughter of Robert Waterston, a Scotchman who emigrated to Boston in the early years of the nineteenth century and set up there a successful importing business, in which Charles Deane later became a partner.

The elder Deane was a man of scholarly tastes who found time, in the midst of a busy merchant's life, to gather a distinguished library and to make himself an authority on the early history of the colonies in Virginia and Massachusetts. His numerous articles on various phases of that subject and his editions of such documents as Smith's "True Relation" (some of which he was among the first to show was

not so true) and Bradford's History of Plymouth Colony stand as models of exact, patient, cautious and understanding scholarship. Bowdoin College in 1871 and Harvard in 1886 recognized their worth with honorary degrees, conferred on their author.

It was, then, into an atmosphere of cultivation and intellectual activity, and of that patient investigation which is the foundation of all knowledge, that Walter was born. He came, also, into a Boston which, physically at least, has completely passed away. Edinboro St. is now in the Chinese quarter. Fort Hill, once high enough to have been chosen as the site of a battery to command the harbor, where later prosperous citizens lived in substantial houses with gardens, Grandfather Waterston among them, was long ago shovelled into the harbor; the streets of the wholesale district pass now without change of grade over the spot where it once stood.

About 1853 Charles Deane moved to Cambridge, living first on Fayette St. and then, from 1859 on, in a house which he built for himself at the upper end of Sparks St. It was in the taste of the time, high, square and mansard-roofed—a town house in type, but then almost in the country. From its site the fields stretched unbroken to Fresh Pond, then a famous botanizing ground; in other directions, too, much open space remained. Walter used to tell how, as a very small boy, he was nearly drowned in a brook near the present buildings of the Andover Theological Seminary. So much of nature near at hand made a good background for the development of an inborn taste for natural history.

One incident of his schooling he never forgot. He was inclined to be left-handed. An early teacher, observing him writing with his left hand, called him up to the desk, extracted therefrom a ruler of portentous size and weight and, fixing a stern eye upon him, exclaimed: "If I ever catch you writing with your left hand again, you'll get this" —and he illustrated with the ruler on his palm. The modern teacher, who would have to explain to the pupil how much more interesting and delightful it really would be to use the right hand, will regard this method with horror, perhaps not wholly unmixed with envy at its effectiveness. For young Walter returned trembling to his seat and from that day to the end of his life wrote—and he wrote much—wholly with his right hand.[1] Possibly some other things, of greater value, were fixed as firmly in his mind.

[1] Except once when for a few days it was disabled by a fall from his bicycle and he made shift, rather successfully, with his left.

He had the normal and wholesome youth of a well-disposed son of a good Boston family of the period—the Cambridge High School (in 1862), Harvard College, whence he graduated in the class of 1870, neighborhood parties, a place in the chorus of the Händel and Haydn Society (to whose concerts he used sometimes to escort a young lady who was to become Mrs. Charles William Eliot), a membership in the Hasty Pudding Club. A photograph taken for his class album shows a singularly attractive face, already expressive of those endearing traits, which, in later life, brought him so large a harvest of affection. For a year after graduation he did private tutoring, then found a position as teacher at St. Mark's School for boys at Southboro, Massachusetts.

St. Mark's seems to have been organized on a friendly basis—or Deane made it so in his own case. The relation between the young instructor and his boys was close; he has said that he both enjoyed and profited by it. Unhampered, in those days, by any rules of eligibility, he played on the school nine. He had so large a share in starting the student paper, The Vindex, that he is regarded as its founder. His photograph hangs in its editorial rooms; he had the pleasure of attending, by special invitation, the fiftieth anniversary of its birth.

One of the headmasters in 1871 was Rev. J. I. T. Coolidge. He was hospitably disposed toward the young teacher; an acquaintance begun in evenings at his house culminated in Deane's marriage with his daughter, Margaret Chapman Coolidge, in the school chapel, December, 31, 1878. Mrs. Deane was of old New England blood, a Channing on her mother's side. She was of unassuming, but individual and engaging personality. The marriage was between two people of like environment and upbringing; it proved as quietly happy as might have been expected.

After seven years at Southboro, Deane took another teaching position in the Hopkinson School on Beacon St. in Boston, then, and for long after, a well-known preparatory school for Harvard. He settled in Cambridge, where both his own and his wife's families were well represented. At first, the Deanes boarded. There was, however, on the Brewster estate off Brattle St., a large wooden building which the elder Brewster had had constructed to house the collection of birds belonging to his son William, already an ornithologist of distinction. But William had firmly refused to trust his birds to any

structure not fire-proof. The would-be museum served for a time as the scene of neighborhood dances; then, losing its vogue for that, stood unused. Deane suggested that it be made over into a block of houses, promising to be the first to rent one of them. Mr. Brewster liked the suggestion; the necessary alterations were made and Brewster St. opened to give access to the block. Thus Deane became possessed of the house which so many botanists have known and associated with him. He moved there in September, 1883, to begin an occupancy of forty-seven years.

Deane remained at the Hopkinson School until the fall of 1895, when a partial break-down in health caused him finally to give up teaching. "He was," writes one of his former pupils, "an admirable teacher of the persuasive rather than the forceful school. As I look back, I think he gave me perhaps as thorough a grounding in history as any teacher could have done . . . and a taste for the subject." His winning and friendly personality could hardly have failed to attract boys as well as men. Certainly his old pupils took away kindly and respectful memories of him and were glad when, in after years, the chances of life brought them into contact with him again.

One incident, though not directly connected with school and trivial in itself, may serve to illustrate his methods. For some years a valued member of the Deane household was a cat. In his old age, rather decrepit and perhaps too trusting, "Jack" was captured by some neighbors' boys, who, heedless of the red ribbon which proclaimed him someone's pet, carried him off and inserted him into an air-duct at their school. Their expectation that his entreaties to be let out would be carried, magnified, over the entire building by the ventilating system was very satisfactorily fulfilled until the janitor discovered the source of the disturbance and cast "Jack" out into the school yard, where he was killed by a passing dog. Deane, investigating the disappearance of the cat, found out the whole story and the identity of the kidnappers. It would have been easy and obvious to complain to teachers or parents; he did neither. Instead, he invited the boys to his house, received them graciously, led them with due seriousness and ceremony to his study, seated them there and told them the story of "Jack" and Mrs. Deane's grief at his loss. I believe he obtained an apology; there can be no doubt that the boys appreciated his dealing with them direct and liked him the better for it.

But, if his ways were gentle, he yet had learned in his own schooling

that there was such a thing as discipline; and he knew how and when to apply it. He had, too, a knack of so phrasing precept or reproof that his boys did not forget it. A little talk to some of his pupils, remembered and recorded by one of them years later, is illustrative of this. "I have noticed," he told them, "that when a hat falls on the coat-room floor, some boys will kick it, more pay no attention; about one in six will pick it up and put it on a hook. I want you to try to be the boy who picks up the hat."

For two years after leaving the Hopkinson School, Deane occupied himself with tutoring, leading small classes in botany organized for him by friends and, as a temporary member of the staff of the Metropolitan Park Commission, in compiling his well-known flora of the park system. This, after some preliminary work on the Commission's herbarium, he completed between December 5, 1895 and February 22, 1896, an excellent record for speed and accuracy combined.

In 1897, after some preliminary testing out of his capacity, Deane was invited by William Brewster to become curator of his ornithological museum; he accepted and served, organizing and cataloguing the collection and assisting in the preparation of Brewster's "Birds of the Cambridge Region," until 1907. Thereafter he had no professional occupation, but busied himself with his many avocations. His life had always been regular—the routine of school, with vacation visits to relatives or friends, or to summer resorts or places of botanical interest; in his later years it settled down to an unbroken series of winters in Cambridge and long summers in a rented cottage on the farm of his old friend Augustus Philbrook at Shelburne, New Hampshire, from which one looks out across the lovely Androscoggin valley to the flanks of the White Mountains and the sharp peaks of Mts. Jefferson and Adams just visible above the nearer hills. After Mrs. Deane's death in 1917, he was cared for with the devotion of a daughter and the discretion of a skilled nurse by Miss Lilla M. Brown, who, coming into the family about 1902 to care for Dr. and Mrs. Coolidge in their old age, remained through the second generation. It is a pleasure to think of him in these later years, in his house full of books, fine old prints and a thousand and one memorabilia of unexpected kind and interest, happily busy about this or that and dispensing an always cordial and thoughtful hospitality.

Outwardly, it was a quiet enough life; but within it was, for him, filled with variety and excitement. The world was so full of a number

of things, and he liked them all. He never lost the capacity for wonder. If he never travelled widely himself (Chicago and Virginia were the farthest limits of his journeys), he enjoyed almost as much the letters and messages and pictures from friends who did. He collected foreign views for the stereopticon and post-card pictures of the bridges of Paris—getting almost a thousand items in this not very promising field. At one time, he even practiced the Yankee art of whittling, producing a wooden chain of considerable length, with each link perfect and working freely in its fellows, and other like knick-knacks. He was, of course, a member, and to the end a faithful one, of the Nuttall Ornithological Club. He banded birds with enthusiasm. He liked astronomy; for years he kept a telescope at Shelburne and was ready to show and discourse upon to all comers the celestial phenomena it revealed. He collected insects for Mr. J. H. Emerton, a specialist on spiders, and for the Museum of Comparative Zoology. He was for forty-two years (1883–1925) secretary of the Old Cambridge Shakespeare Association and for all that time did much of the work of making up the numerous casts for the play-readings which accompanied each meeting. He used to say laughingly that after he retired it took a whole committee to do what he had been wont to do alone. The list of his interests and avocations might be extended almost indefinitely; but here we are chiefly concerned with his botanical activities.

"In the summer of 1880," he wrote in a class report, "my interest in the study of botany was suddenly aroused by the analysis of the little Dalibarda (*Dalibarda repens*, L.), a plant common in our rich New England woods. From that instant every spare moment for many years has been devoted to the study and collection of the flowering plants and the higher flowerless or cryptogamous plants of the Northeastern United States." In August, 1880, he pressed his first specimen, a *Gerardia*, still in his herbarium and annotated as having been determined by Dr. Gray as *G. purpurea*. His interest grew rapidly. Wherever he went he collected specimens, alone or in the congenial company of such kindred spirits as Judge J. R. Churchill and Dr. G. G. Kennedy. Almost from the first, he was no routine collector, content with a single specimen of a given species from a given locality. Whenever he could (as at his summer home at Shelburne) he secured a series to show the species from bud to fruit and to show range of variation. He went even further back, to the

seedling. His collection of these, showing the young plants from cotyledon to the third or fourth leaf, was perhaps unique when he began it and is still unusual. In the case of herbaceous species of tall growth he often prepared a series of numbered sheets showing a typical plant from root to tip. His specimens were always well chosen and prepared with skill and untiring patience—how untiring may be realized from his statement that he once untangled and secured, entire and unbroken, the fragile rootstock of an oak fern with fifteen branches, eight living fronds and a total length of eleven feet.

In addition to his own collecting, he bought and exchanged widely with other botanists. Many notable sets were thus acquired—Bebb's willows, Morong's *Najadaceae* (probably the best set except Morong's own), Bailey's and Olney's *Carices*, Small's and Heller's and Curtiss's collections from Pennsylvania and Virginia, Sandberg's from Minnesota, C. E. Lloyd's from Ohio, Bush's and Glatfelter's from Missouri, Lunell's from Dakota, and very full sets of duplicates from Churchill, C. F. Batchelder and other associates nearer home. For the most part, he limited his herbarium to the plants of the Gray's Manual region, but this limitation was by no means rigid. Plants from other parts of North America and European species which might be useful for comparison were not excluded.

Deane no doubt knew Dr. Gray socially before he became interested in botany. When he did and felt the need of expert aid in making determinations, having the fountain-head of botanical knowledge at hand, he naturally turned to it. He liked to tell how he would go over early to the Herbarium and spread out on a table the plants which needed attention; and how Dr. Gray would come in with his characteristic quick, tripping gait and after a cheery good-morning and a "Well, well, what have we here?", proceed to name the specimens at a speed which probably even the best of us would hesitate to attempt nowadays. On one occasion he said, "If you will take this to that young man at the table in the corner, he will attend to it for you." The young man was L. H. Bailey, and a life-long friendship began then and there.

In whatever he did, Deane made friends and kept them. It is doubtless too much to say that he never lost one except by death, but he cannot have lost many. Botany was no exception. His library contained a full set of author's copies of the works of one distinguished and prolific botanist; he stood godfather for the children of another;

still another named a son and a genus after him. Few taxonomists who visited Cambridge were allowed to miss at least a taste of his pleasant hospitality. Mrs. Deane seconded him faithfully, though she used sometimes humorously to complain that the miscellaneous botanists he brought home to luncheons and dinners were rather prone, when they descended from the herbarium room, to say "Ah, how do you do, Mrs. Deane?" and then, turning to Mr. Deane, "Now, as to that *Podophyllum peltatum*, I think . . . ", and so on to the end of the meal. But she was hospitably ready for the next one.

These connections, begun in meetings at the Gray Herbarium and little visits at his house, but rarely stopping there, reacted on Deane's botanical work and especially show their results in his herbarium. He would have been the last to attempt establishing a friendship for what he could get out of it, but personal acquaintance and scientific service went, naturally, hand in hand. Each botanist who visited the Deanes, if he were working on any particular group, would examine and name Deane's material of that group. The advantage was mutual; the excellence of the specimens and the notable exsiccatae they included made them worth the specialist's while, and Deane acquired the expert and authentic determinations which any owner of a working herbarium wants. The result is an extraordinarily well documented collection; many of the sheets bear as many as half a dozen successive annotations by experts from Drs. Gray and Watson to the latest monographer.

It was not for nothing that Walter was the son of that patient investigator, Charles Deane. The father once in England spent weeks collating the manuscript of Bradford's History of Plymouth Colony that he might discover and correct any errors of detail in the transcript which he had used in his own edition of it. The son was equally particular with each detail of his herbarium. I have spoken of the thoroughness and skill of his collecting; they were carried on through the whole process of herbarium-making. For years he did all his mounting himself with exquisite care; later he had the expert assistance of Miss Anderson of the Gray Herbarium and one or two others. He loved to arrange and index and record. For months he set down in his journal the number of miles he rode on his bicycle each day; for years he entered two daily temperature-readings, daily or seasonal lists of plants and insects collected and birds seen and the number of sheets mounted at each sitting. When his herbarium

grew too large for any single room in his house and had to be distributed among several, he devised for it an elaborate topographical index which showed the exact location of each case and each genus in it. I am sure he used this index sometimes for the pure pleasure of it, when he could perfectly well have found needed specimens without it.

The result of all these tendencies, continued to the end, was an herbarium as notable in its way as his father's library. By 1895 it was already distinguished enough for a notice in Science. At his death it contained about 40,000 sheets in most excellent order, many of them, because of the annotations referred to, veritable historical documents. Probably no better personal collection was ever gotten together in the United States.

It is because the herbarium was so notable that I have dwelt on it so much; but it was, of course, by no means all of Deane's botanical activities. A teacher by profession and instinct, his impulse was to pass on his botanical knowledge as it was acquired and sufficiently digested. He soon began to produce a series of short articles published in the earlier volumes of the Botanical Gazette, the Bulletin of the Torrey Botanical Club, the Plant World, etc. Later, he was a frequent contributor to Rhodora, beginning with the first number in 1899.

Like many competent amateurs, he was modest and hesitant in attempting original taxonomic work—a tendency intensified in him by a certain lack of self-confidence. He was content to leave the defining and describing of species to the professional. Also, of course, his work lay in a region the flora of which is comparatively well-known and which offers little opportunity for the finding of obvious novelties. The description of one new species, in collaboration with Dr. Robinson, and the naming of a few varieties and color-forms were, therefore, the sum of his strictly taxonomic achievement.

His published notes were, however, not of the trivial sort which merely pass on pleasantly, to those who like their knowledge predigested, what is already well-known. They were the literary result of his observant and original collecting; they deal with the methods thereof and with habits and parts of plants not noticed in current manuals of the time—such as the rhizome and fruit of the water-lily; the exact time needed for the opening of a bud of the evening primrose (10 seconds); the curious mechanism of seed-dispersal in *Oxalis montana;* the summer foliage of sweet grass (*Hierochloe*). He rarely attempted to draw deductions; but as records of observation his

notes are admirable. Forty of the descriptions of botanical tribes and genera in the Century Dictionary are his. His study of the gradual change in the salt-marsh vegetation on the banks of the Charles River in Cambridge after the building of the present Basin had cut them off from salt water, is wholly typical both of his quickness to perceive opportunities for original observation, of the thoroughness of that observation and of his tendency to limit himself to the organizing and recording of its results with little attempt to draw general conclusions.

In floristics his interest in details and his talent for arranging them had full play. His Flora of the Metropolitan Parks, an excellent piece of work, has already been mentioned. He contributed several of the earlier installments to the series of "Preliminary Lists of New England Plants" in Rhodora. He served through almost all the sixteen years' life of the committee which prepared the elaborately documented Flora of the Boston District, published in installments in Rhodora, and was one of the two members who remained to the end.

His many friendships caused him to be in demand as a writer of obituaries. For Gray, Watson, Bebb, Morong, Penhallow, Mrs. Owen and others he provided pleasantly written, sympathetic and appreciative memorials.

In endless other ways, he was helpful. He named and distributed sets of duplicates for friends who had less time for it than he. He assisted with the manuscript of Mrs. Owen's Flora of Nantucket, Rand and Redfield's of Mt. Desert and Pease's of Coös County, New Hampshire. He collected many specimens for many specialists.

It was inevitable that a man of Deane's cordial and amiable disposition should associate himself intimately with the other botanists, amateur and professional, of the Boston region. It was equally inevitable that when the New England Botanical Club was formed (Dec. 10, 1895) he should be one of the twelve charter members and one of the first Council. From that day until his death there was never a time when he did not hold some office in the Club. He served it as a member of committees, vice-president, president (1908–1911), curator and librarian. The last office came to him in celebration of his seventy-fifth birthday. The Club had gradually acquired a small collection of books and pamphlets relating to New England botany and useful in connection with its herbarium. They needed some care; it was felt that Deane could not be more fittingly honored than by

providing for them. A fund of about one thousand dollars was made up by contributions from members of the Club. It was presented with due ceremony, the income to be used primarily for maintaining and increasing the collection of books. The office of librarian was created and Deane chosen its first occupant. He served until two years before his death.

His unfailing interest in botany and his willingness to join in enterprises connected with it enlisted his aid for professional as well as amateur activities. In 1891 he was appointed to the Overseer's Committee to visit the Botanical Department of Harvard College, the other members then being F. H. Peabody and Walter Hunnewell. He served on this committee until 1896. From 1923 until it was merged in the general committee for botany in 1929, he was on the Visiting Committee for the Botanical Museum. He was much interested in the Ware collection of Blaschka glass models of plants and assisted in gathering material for Mr. Blaschka to copy.

His friendship—there is no other word for it—for the Gray Herbarium extended over nearly half a century. He was a frequent and welcome visitor there. In 1918 he presented to the Herbarium his entire collection of botanical pamphlets and clippings, some 2600 items in all; smaller gifts of money, literature and specimens and less tangible, but none the less real, kindnesses were scattered freely through the fifty years. In 1897, when the Visiting Committee for the Gray Herbarium was established, he was appointed a member and remained one, almost continuously, till his death. He had his part in the largest undertaking of the Herbarium in his time, the planning and construction of the present excellent building; to this enterprise he brought an infectious enthusiasm which not only inspired his own efforts but aroused and stimulated interest in others.

He is commemorated botanically by the genus DEANEA Coulter & Rose, a small group of Mexican *Umbelliferae*.[1]

Fittingly and mercifully, his last illness was gentle. There was little suffering; outwardly it seemed no more than a gradual cutting down of activity, a transition from chair to bed, from waking to the coma in which he quietly passed away on July 30, 1930. He was buried from the College Chapel. His will provided for the division of his

[1] I am much indebted, for their kindly interest and aid in the preparation of this paper, to Miss Mary Deane Dexter, Mr. Ruthven Deane, Dr. Benjamin L. Robinson and Mr. Roger L. Scaife.

herbarium between the New England Botanical Club and the Gray Herbarium, and for the gift of his botanical library and correspondence and his collection of portraits of botanists to the latter. There was a bequest of one thousand dollars to the Club and twenty thousand, plus the reversion of a trust fund on the death of the beneficiary, to the Herbarium. Thus he continued into the future his long service to both.

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. Fernald

(*Continued from page 63*)

From Woody Point (plate 237) one looks back to the Canadian forest on the slope of Lookout Mountain and across to the alternately wooded and bare slopes on the opposite side of the Arm. Farther up the Arm, but standing some miles to the south, is The Tableland, a flat-topped and great, seemingly naked block of serpentine (2336 feet high), weathered pinkish- to yellowish-ochre and looking like a gigantic pale brick wall, only streaked down its side with lines of white snow-fields. Lesser rounded knobs lie between it and the "bottom" (we should say the head) of the Arm and, towering above them, like a small Matterhorn, rises the sharp pinnacle of the Peak of Teneriffe. That was our view upon landing and we were impatient to get everywhere at once.

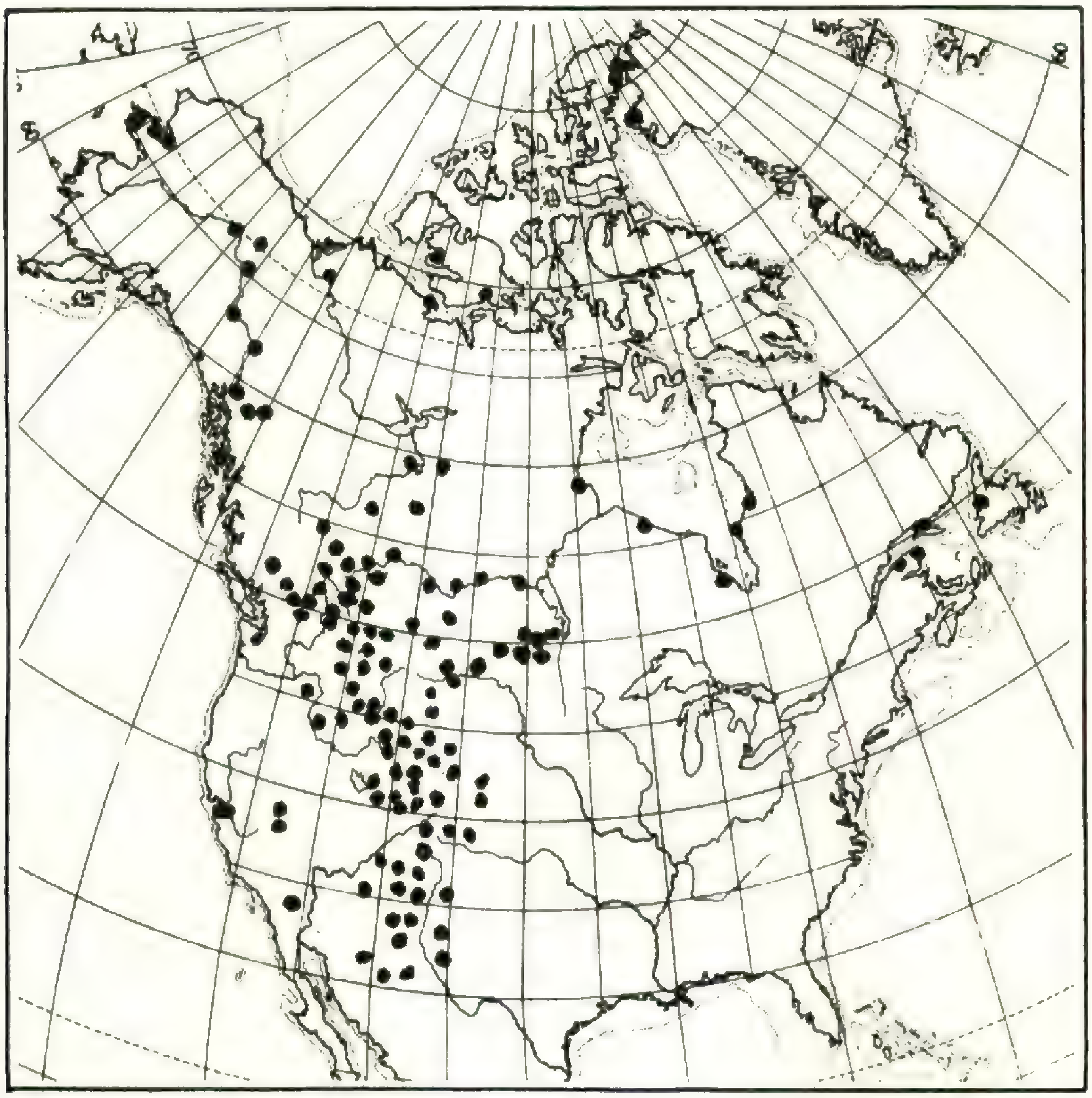
Space will not permit a detailed account of the daily knee-jolting trips and the thousand-and-one incidents of our stay at Bonne Bay. We soon discovered that it was as little "worked out" as Bay of Islands, Old Port au Choix and the dozen other areas along the West and Northwest coast of Newfoundland visited by the party of 1925. Mr. Preble promptly adopted us; and with him in his motor boat, and with a liberal supply of his fresh fruits and cream and home-made cakes, cookies and pies, to say nothing of roast chickens, we spent every day possible, from early morning to late evening, exploring the Bay and its headlands and mountains. Off days there had to be when we were forced to stay indoors caring for the presses, drying our paper in intermittent patches of sunshine and (without openly admitting it) resting our muscles and joints after the difficult climbing. Two or three talus-slopes a day were as much as we could stand;

but, when these necessary respites occurred, our ever ready and always companionable new friend was alert to hurry us through, that we might get started on another trip. Equipped with a botanizing pick and collecting box he became a fourth member of the expedition and was soon distinguishing at sight the newly found from the already collected species of *Agrostis*, *Poa* and *Festuca*. No botanical expedition should go to Bonne Bay without invoking the aid of Mr. Preble.

Whereas the Arm where Woody Point is located (I hesitate between "South Arm" and "West Arm") has several settlements comparable with those of Humber Arm of Bay of Islands, the equally extensive Main Arm is unsettled, except for the canning-factory at Lomond; and, like the Middle Arm of Bay of Islands, its southerly side is shut in by precipitous walls, repeating almost exactly the rocks of Middle Arm: fantastically contorted strata of limestone, limy slate and sandstone. To the north, beyond the slender head of East (or Deer) Arm, the round-edged block of Gros Morne (2540 feet) dominates the horizon, flanked by a series of lesser knobs; then on the northerly side of the Main Arm come two great quartzite masses, tipped at their westerly crests by conspicuous uplifted limestone cliffs, Gallie's Head (2290 feet) and Killdevil (2135 feet), and farther to the east still others beyond our reach. The south side of the Arm is almost wholly limestone, with a regular alternation of vertical walls, flanked with high talus, and coves with flats, ponds or bogs. The names, themselves, were attractive and there was romance in making landings at Shag Cliff or Tucker's Head or at Store-house Cove, Beachy Cove and Lord-and-Lady Cove (PLATE 238).

The lower slopes of limy talus (all we had time or climbing ability to get at) were a joy. "Rock Polypody," *Thelypteris Robertiana*, Holly Fern, *Polystichum Lonchitis, Kobresia simpliciuscula, Carex scirpoidea, Luzula spicata, Salix vestita, Saxifraga oppositifolia, Dryas integrifolia, Potentilla nivea, Hedysarum alpinum, Rhododendron lapponicum, Solidago multiradiata* and *Arnica chionopappa* were so common that we thought twice before collecting them; then yielded to the temptation. *Woodsia glabella, Sphenopholis pallens, Silene acaulis* var. *exscapa* and *Lesquerella* were so local that we did not hesitate; and when, high on Tucker's Head (PLATE 238), we found two individuals of *Androsace septentrionalis* L. (MAP 5), new to Newfoundland, we hunted, vainly, for more material. Mr. Preble

insists that it is not "new to Newfoundland," for he is positive that he has seen it in abundance on Gros Morne. We are inclined to believe him; but Gros Morne still awaits botanical exploration. The subalpine grass known as *Festuca rubra* var. *prolifera* Piper (PLATE 241) abounded, here, as elsewhere in Newfoundland, characteristic of cold limy walls. In its almost uniformly simple and flexuous raceme



Map 5. American Range of ANDROSACE SEPTENTRIONALIS.

(rather than forking panicle) and in its membranaceous and awnless lemmas it has always seemed to me very different from the ubiquitous *F. rubra* of circumneutral to acid lowlands. On Bonne Bay we were so fortunate as to find some culms of the normally viviparous plant with perfect florets; these have anthers so much smaller than in *F. rubra* that in Part III I shall formally treat var. *prolifera* as a definite

species. Another grass, as characteristic of these cliffs as the *Festuca* or as *Poa glauca* and *Agrostis borealis*, is *Poa trivialis*, rather general on cool slopes or in mossy openings in Newfoundland and here certainly indigenous. With the essentially boreal species it was disconcerting to find Herb Robert, *Geranium Robertianum*, abundant. Wiegand had got it in 1910, but it is highly localized in western Newfoundland. *Antennaria* was at its best. The beautiful brown-headed novelty (PLATE 265) of the limestones of Hannah's Head and Druid's Head (on the Bay of Islands) carpeted one shelf on the cliffs of Tucker's Head (PLATE 238), while another shelf supported the white-headed plant (PLATE 268) of Penguin Head.

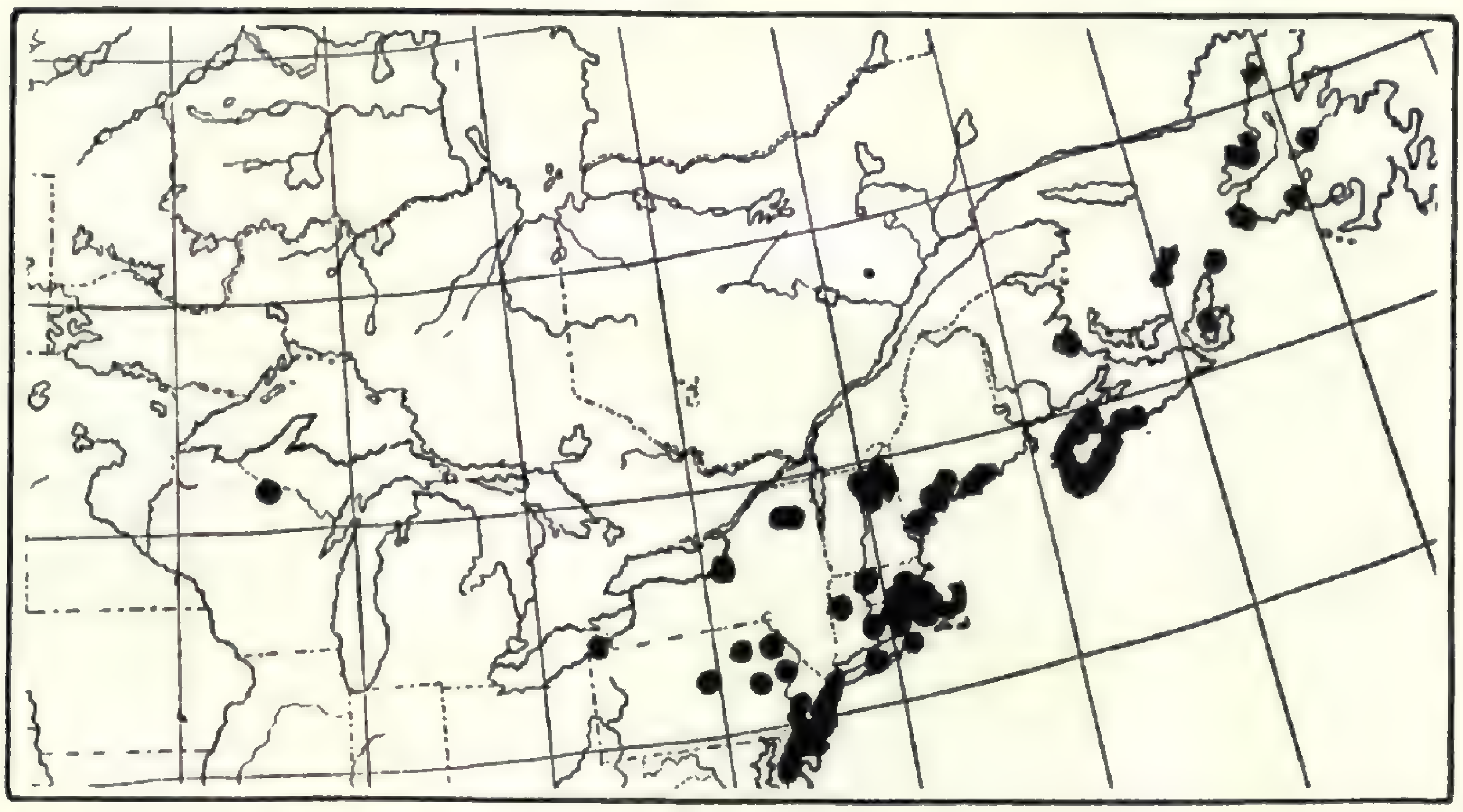
Wiegand had been on Lookout Mountain and on The Tableland in 1910; but they are such prominent features of the landscape and so emphatically contrasted with the limestone cliffs of the Main Arm that we wanted to climb them too. The day we went to The Tableland (PLATE 237) it was densely foggy in the morning, but it cleared in mid-forenoon—so clear that we ambitiously laid out a programme including The Tableland, seven miles back from the Bay, and then the Peak of Teneriffe which, deceptively, looked near-by. We got in to the northern slope of The Tableland, botanizing along Winterhouse Brook and on the lower serpentine plains, ascended by one of the snow-fields (PLATE 232) and tramped over the northern part of The Tableland proper, finally descending by a precipitous brook-valley, where, in chasms of the rock, chunks of ice 30 feet thick still lingered, and returned home. We had tramped, much of the time vertically and on the most slippery of wet magnesian rocks, about 25 miles; and the Peak of Teneriffe is still not botanized. It was a magnificent tramp and dramatically interesting but, botanically, productive of no novelties. Wiegand had got most of the specialties in 1910 and Long and Fogg had seen them on the North Arm of Bay of Islands in 1926; but, selfishly, I was delighted to see them again and, in a paternal way, so to speak (as sponsor of four of them), to reassure myself that they still abound on this great serpentine barren: *Adiantum pedatum* var. *aleuticum*, *Danthonia intermedia*, *Salix anglorum* var. *kophophylla*, *S. cordifolia* var. *Macounii*, *Arenaria marcescens* (PLATE 255) and *cylindrocarpa* (PLATE 256), *Cerastium terrae-novae* (PLATE 257) and always puzzling plants of the *C. arvense* affinity, *Lychnis alpina* L., *Conioselinum pumilum*, *Statice labradorica* and *Solidago hispida* var. *tonsa* Fern. On the lower barrens,

where it was moist and peaty, the handsome *Carex Wiegandii* Mackenz. abounds, the northernmost station yet known; and with it grows fairly typical *Pyrola rotundifolia* L., also at a northern limit. Thickets along Winterhouse Brook are our northernmost station for the New York Fern, *Thelypteris noveboracensis* (L.) Nieuwl. and for several other but inconspicuous species (in *Carex, Juncus,* etc.). The *Juncus alpinus* of these lower barrens was nearer the typical plant of Europe than much of the American material. But I get little satisfaction from trying to follow the recent segregations proposed in Europe (see Part III); the Newfoundland plants vary from simple individuals with 1 or 2 glomerules to others with 25 or more. These variations are very obviously responses to minor conditions of habitat. It seems sufficient to treat the Newfoundland plants as typical *J. alpinus,* with flowers all sessile or uniformly short-pedicelled; and var. *rariflorus* Hartm. (1849) (var. *insignis* Fries (1890), *J. nodulosus* Wahlenb. (1820)). Var. *alpestris* Hartm. and *J. nodulosus β. biceps et uniceps* Laestad., sometimes maintained, seem to be merely dwarf or poorly developed states. At one point *Carex Buxbaumii* had very pale (almost whitish) instead of dark scales, f. *dilutior* Kükenth., which we had never met.

We spent two days on Lookout Mountain, the first collecting on the slope and making a start on its broad tableland (the uplifted Cretaceous Peneplane), at about 1800 feet altitude. The second day we crossed the tableland and the most strenuous member of the party (B. L.) went to one of the Lookouts, bare castellated and ragged crags of rotted diorite (alt. about 2500 feet) at the western edge of the plateau. The second day was sultry, and so hot that the younger members of the party stripped to their BVD's; and, instead of enjoying the cool and bracing air of a theoretical mountain-top, we boiled and simmered all day. By afternoon, at each step we were saying, "What's the use?"; still we plodded hopefully on across the peaty barren. When we got back to Woody Point in the evening we found everyone panting, with the mercury at 100° Farenheit! Such midsummer days are not uncommon on the tablelands of Newfoundland.

Experiences on the tableland of Blomidon in 1910, on that of Lark Mt. in 1926, and others recorded earlier in this journal should have taught us; nevertheless, we went from the sea-level rocks and taluses of Bonne Bay, with their subarctic and even high-arctic species,

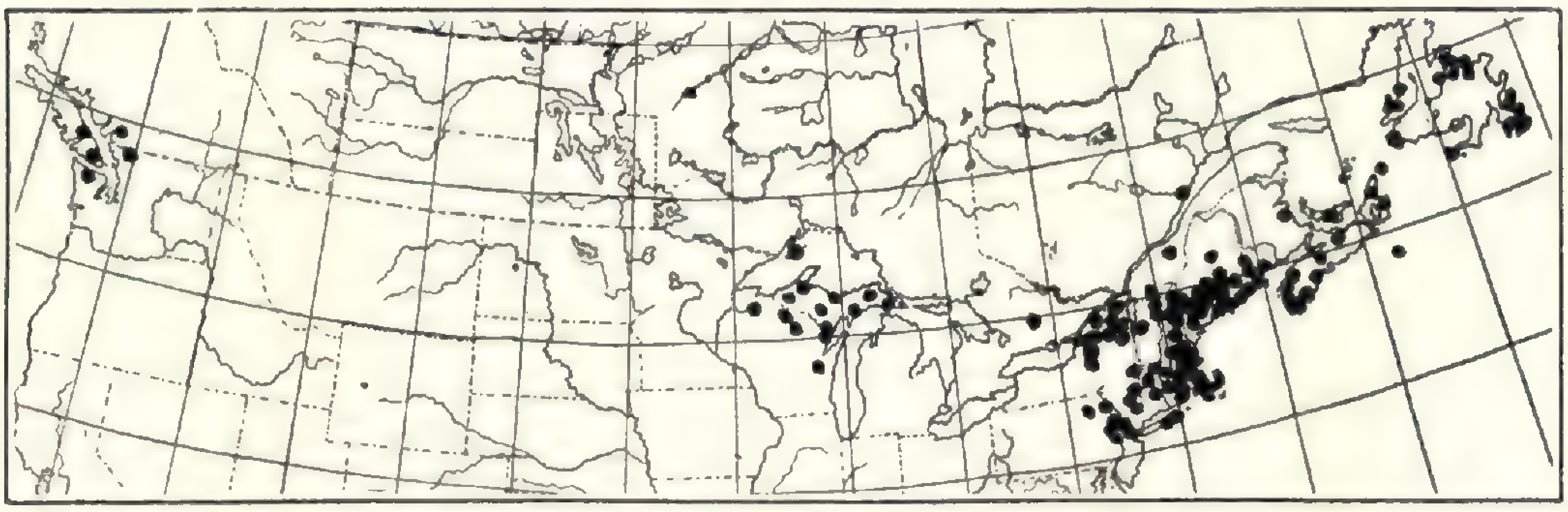
to the tableland of Lookout Mountain actually expecting to find an alpine flora! Instead, the great plateau is like that of Blomidon or of the Topsail region, a prairie-like expanse of peat, with innumerable shallow depressions and small pools. In the pools one finds occasional colonies of the boreal *Sparganium hyperboreum*, but much more often the Coastal Plain *Utricularia geminiscapa* Benj. (*U. clandestina*) (MAP 6) and the New Jersey Pine Barren *Potamogeton confervoides* and *P. Oakesianus*. *Pogonia ophioglossoides, Calopogon pulchellus* and *Habenaria clavellata* are there, and the crimson-flowered *H. psycodes* is positively dominant. *Rynchospora fusca* and *alba, Carex exilis* and *livida* (var. *Grayana*) and *Juncus pelocarpus* abound. Kneeling by



Map 6. Range of UTRICULARIA GEMINISCAPA.

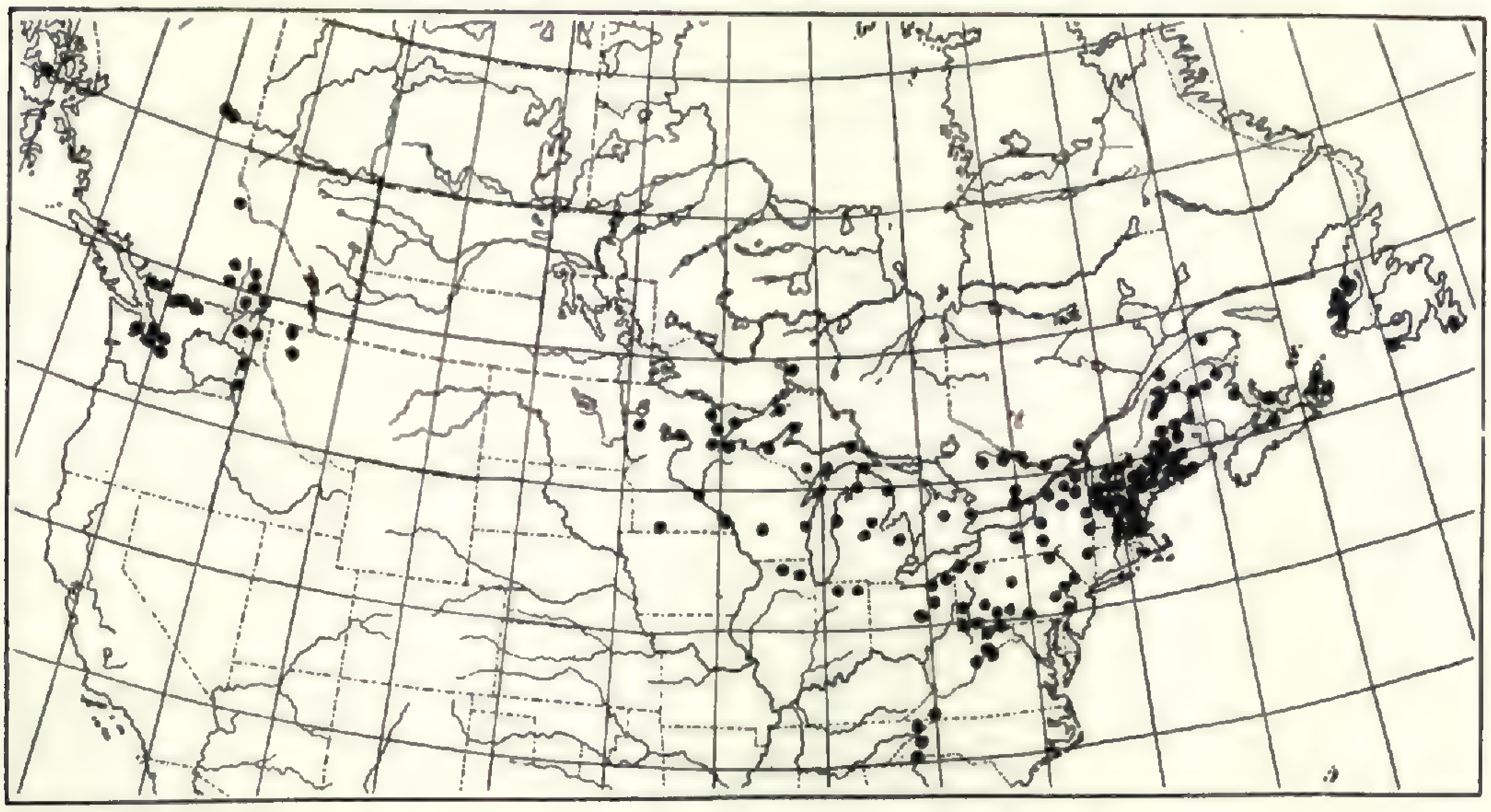
the peaty pools one finds himself in the inevitable *Schizaea pusilla* (MAP 7) of the Pine Barrens, and *Bartonia*, and very often *Muhlenbergia uniflora* (var. *terrae-novae*); and in a rock-bottomed tarn nearly over to the Lookouts *Lobelia Dortmanna* (MAP 8) flourishes. The only notable plants, where we spent the most time (on both days) studying these peaty barrens, which do not occur in southern New Jersey are the *Sparganium* (*hyperboreum*), the tiny yellow-fruited *Eleocharis nitida* Fern. (which formed such dense carpets that I was inclined to jeer Long for having overlooked it in the Pine Barrens), and *Drosera anglica*. About many pools, either with *D. anglica, D. rotundifolia* and *D. intermedia* Hayne (*D. longifolia* L. in part, a name too confused in its application) or in extensive colonies by it-

Map 7. Range of Schizaea pusilla.



Map 8. American Range of Lobelia Dortmanna.

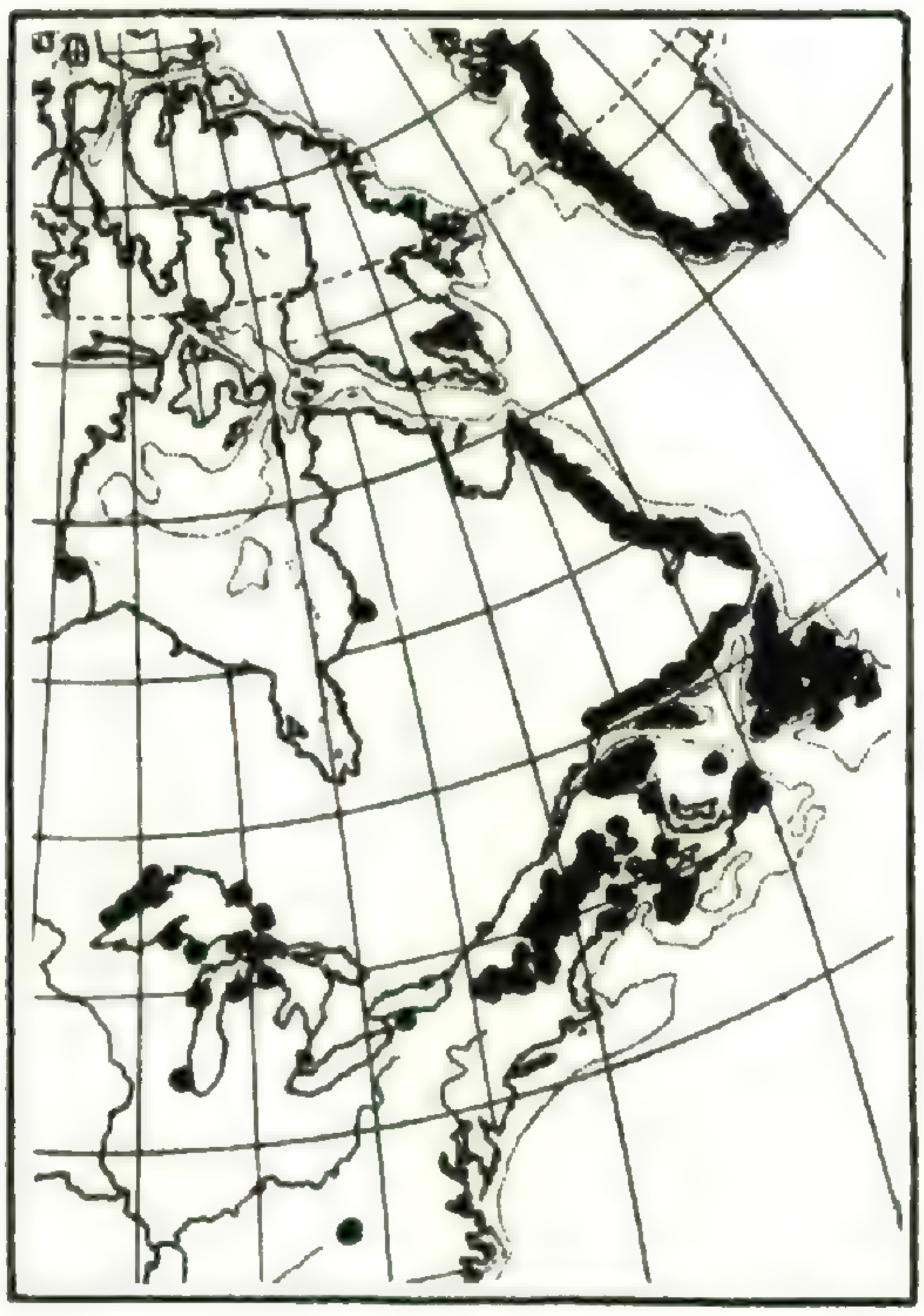
self, was another *Drosera*, quite strange to us. This proved to be the European *D. obovata* Mert. & Koch., new to North America. In Europe it is sometimes treated as a species; sometimes as a variety of *D. anglica* (*D. anglica* β. *obovata* Planch.); sometimes as a hybrid of *D. anglica* and *D. rotundifolia;* again as a hybrid of *D. anglica* and *D. intermedia.* As stated, on Lookout Mountain *D. obovata* is locally abundant, either with the other species or quite by itself, in the borders of peaty depressions. It and *D. anglica* are equally abundant; *D. intermedia* next; and *D. rotundifolia* comparatively scarce. Those who wish to get fresh material of all four together will find it in the depressions and pools to the west of the path as it reaches the tableland of Lookout Mountain. As already stated, *Habenaria orbiculata* (map 9) was here growing in turf of the ubiquitous arctic-alpine *Scirpus cespitosus* var. *callosus* (map 10). We had difficulty



Map 9. Range of Habenaria orbiculata.

in believing our own eyes and, at my request, Fogg made detailed drawings of its flowers, lest we might forget how the fresh flowers appeared; but we cannot make it anything but *H. orbiculata* of "rich woods" on the continent.

By the time we had got well up on the bases of the dry diorite peaks (the Lookouts), Fogg and I were content to linger over banks of the charming little chocolate-flowered *Euphrasia Williamsii* var. *vestita* and to let Long tackle single-handed the ragged and bleak crest. His only trophy was a mass of over-ripe *Antennaria cana* (Fern. & Wieg.) Fern., one of the most attractive of the genus, this station the first south of Pointe Riche.



Map 10. Eastern American Range of Scirpus cespitosus, var. callosus.

We, of course, wanted to get on Gros Morne, Gallie's Head, Killdevil, the Peak of Teneriffe, and other mountains of which we did not learn the names. We were, however, drawn in so many directions and were so controlled by the frequent fogs that Killdevil was the only other mountain touched. The vividness of the descriptive name reflects the reputation of its steep slope among people who have always lived and hunted among precipitous hills; and in the ascent and descent Mr. Preble, although retired for several years, showed the result of long training and greatly outstripped the boys. We had other reasons for lagging besides shortness of breath. Killdevil, where the steep path has been worn, is composed of very silicious rock; and high on its slope we found the southern *Cypripedium acaule*, at the only station we saw around Bonne Bay. We were also interested in comparing the flavors of different blueberries! At one point on a rock-slide of the quartzite a few plants of *Solidago calcicola* frankly belied its name, though we suspect that it is a waif blown in from some more favorable habitat near-by. *Woodsia ilvensis*, which we had not seen lower down, was unusually large on the

quartzite cliffs; and when we reached the comparatively narrow tableland we found a very perfect demonstration of the three crowberries of Newfoundland: *Empetrum nigrum, E. nigrum* forma *purpureum* (Raf.) Fern., with plum-purple fruits (new to Newfoundland) and *E. Eamesii.* The summit-ridge was as disappointing as the dry slopes, with only enough *Phyllodoce caerulea* and *Carex stylosa* to keep it from being utterly hopeless. Plodding doggedly on to the west, we were suddenly conscious of an abrupt change: the regular western Newfoundland Saxifages and Drabas, *Carex rupestris, Solidago multiradiata, Tofieldia minima* and other old friends. The extreme westerly crest of Killdevil was limestone, just as if some of the limestone at sea-level, with its distinctive flora, had been torn out by the uplift of the quartzite block and carried up to 2100 feet; and, just as fate has decreed in so many cases, we reached the interesting botanizing when it was time to start back, if we were to make the shore safely before dark. But we had to investigate a little: *Woodsia alpina* here mingled with *W. ilvensis; Botrychium matricariaefolium, Arabis Drummondi, Habenaria viridis* var. *bracteata* and *Antennaria neodioica* var. *attenuata* gave a singularly southern aspect, rather than alpine; but a thicket of *Salix cordifolia* var. *callicarpaea* (Trautv.) Fern., the tallest we have ever seen (sheltered in crevices in the limestone) was decidedly more boreal; and *Potentilla norvegica* var. *labradorica* (Lehm.) Fern. and *Galium kamtschaticum*, in its shade, and *Epilobium lactiflorum* Hausskn. in the thickets of *Salix vestita*, were also boreal. Another *Antennaria* (undescribed, PLATE 266), with the largest brown heads of any in Newfoundland, made a fine carpet, strongly contrasting with the pale-headed species with which it grew. It was getting so close to twilight that we were ticklish about climbing around the rotted limestone; but Fogg volunteered to cross over to a more western crag, though he promptly returned, driven out by millions of mosquitoes which were beginning to assemble for the evening. He had *Oxytropis johannensis* Fern.[1]; and from the crest he had reached a high escarpment of limestone evidently extended for thousands of feet toward the Bay—unworked and awaiting a party with plenty of daylight. A similar high escarpment seems to occur at the westerly crest of Gallie's Head; and, through the woods to the east of Killdevil, we could see others; there is plenty

[1] RHODORA, XXX. 145, t. 173 (1928).

to do, and we should not mind if the Appalachian Mountain Club discovered the region and cut some good trails.

Mr. Preble was anxious for us to see the deadwaters of Main River, which enters Main Arm, for "every kind of flower" grows there. So, one day, August 19th, we landed on the alluvial flats, planning to follow up river four miles to his flower-garden. The flats where we landed proved too fascinating and by night we had scarcely got out of sight of the moored boat. Another trip on the 27th, after Fogg had been obliged to return home, pleased Mr. Preble no better: we grubbed about in the tidal flats and got nowhere near the real area of wild flowers which he was intent on showing us. It was too much to expect him to appreciate all the range-extensions we were noting. *Typha latifolia* formed a dense (though sterile) stand at the border of a bog, where *Scheuchzeria palustris* var. *americana* Fern. reaches a northern limit and where the yellow-green *Sarracenia purpurea* forma *heterophylla* (Eaton) Fern. abounds. The *Typha,* Mr. Preble told us, is really abundant some miles farther north, along Baker Brook, where the fish-packers go to get their "flag." In the woods and thickets *Fraxinus nigra* and *Corylus cornuta* Marsh. (*C. rostrata*) were reaching northern outposts; and the abundant *Arceuthobium pusillum,* parasitic on *Picea mariana,* was also an extension northward. Various *Carices* were also absorbing our attention, very complex series in the *flava*- and the *stellulata*-groups. In wet swales *Myosotis laxa* and *M. scorpioides* both abounded; and one alluvial woodland had a great abundance of *Trillium cernuum,* another northern extension. To a New Englander these were, of course, a very tame lot of species; but they were significant as showing the very temperate conditions in sheltered river-estuaries, as contrasted with the arctic quality of the typical shore-vegetation on the outer coast.

The halophytes particularly absorbed us. The brackish mud-flats were carpeted with *Eleocharis parvula* (R. & S.) Link (*Scirpus nanus*), at a new northern limit; and mixed with it, and at first almost indistinguishable from it, was *E. acicularis* var. *submersa* (Hj. Nilss.) Svenson[1] of Greenland, Arctic America and Labrador, new to Newfoundland. *Carex hormathodes* abounded in the brackish shores, an extension north from Bay St. George, and with it *Juncus Gerardi,* also a northern extension. At one point there was an extensive development of *Scirpus americanus* (all sterile at this northeastern

[1] Svenson, Rhodora, xxxi. 188 (1929).

outpost); and the southern and chiefly maritime *Juncus articulatus* var. *obtusatus*, new to Newfoundland, abounded. The shallow films of salt water were filled with *Zannichellia palustris* var. *major* (Boenn.) Koch and a jumble of variations of *Ruppia maritima*,[1] the latter all growing together and clearly not individual responses to different depths and temperatures of the water: var. *obliqua* (Schur) Aschers. & Graebn., a European variety which we now know very generally about the Gulf of St. Lawrence (western Newfoundland, Miquelon, Anticosti, the lower St. Lawrence, Magdalen Islands, Prince Edward Island and Cape Breton); var. *intermedia* (Thedenius) Aschers. & Graebn., more local in eastern America (our station at the mouth of Main River and salt marshes of Rimouski Co., Quebec); and var. *brevirostris* Agardh, another variety (in Europe often treated as a species) known in America only about the Gulf of St. Lawrence (our new station, the first in Newfoundland, the "Côte Nord" of Quebec, and the Mingan Islands and the Magdalen Islands).

These and numerous other halophytes held our attention through much of our two days at the mouth of Main River; but above the saline area the broad gravelly or alluvial flats will be quite as productive. When we were there they were a splendid show of the exquisite creamy-white flowers of *Parnassia caroliniana*, the blue-purple and white of the delicate racemes of *Lobelia Kalmii*, and bright red of the fruiting racemes of *Tofieldia glutinosa*. *Juncus Dudleyi*, purplish-bronze in maturity, was a good find, in Newfoundland previously known only from the Bay of Islands; and these alluvial islands seemed to be the center of distribution of the usually rare *Carex Hostiana* var. *laurentiana* Fern. & Wieg.[2] It formed fine tussocks over a large area and with it were several tussocks of what was apparently a hybrid of it with *C. flava*. Near by, *C. flava* was also crossing with *C. Oederi* var. *pumila*. *Solidago lepida* var. *elongata* (Nutt.) Fern.,[3] the first east of Gaspé, was in the borders of thickets; and the flats were often covered with willows like those of northern Maine and northern New Brunswick: *Salix lucida* and its var. *intonsa*, *S. cordata*, *S. pellita* and *S. glaucophylloides* Fern.

We did not come within two miles of the area Mr. Preble was anxious for us to see, where "every kind of flower" grows. That,

[1] For revision of the North American varieties of *Ruppia maritima* see Fernald & Wiegand, Rhodora, xvi. 119–127, t. 110 (1914).

[2] Rhodora, xxvi. 122 (1924).

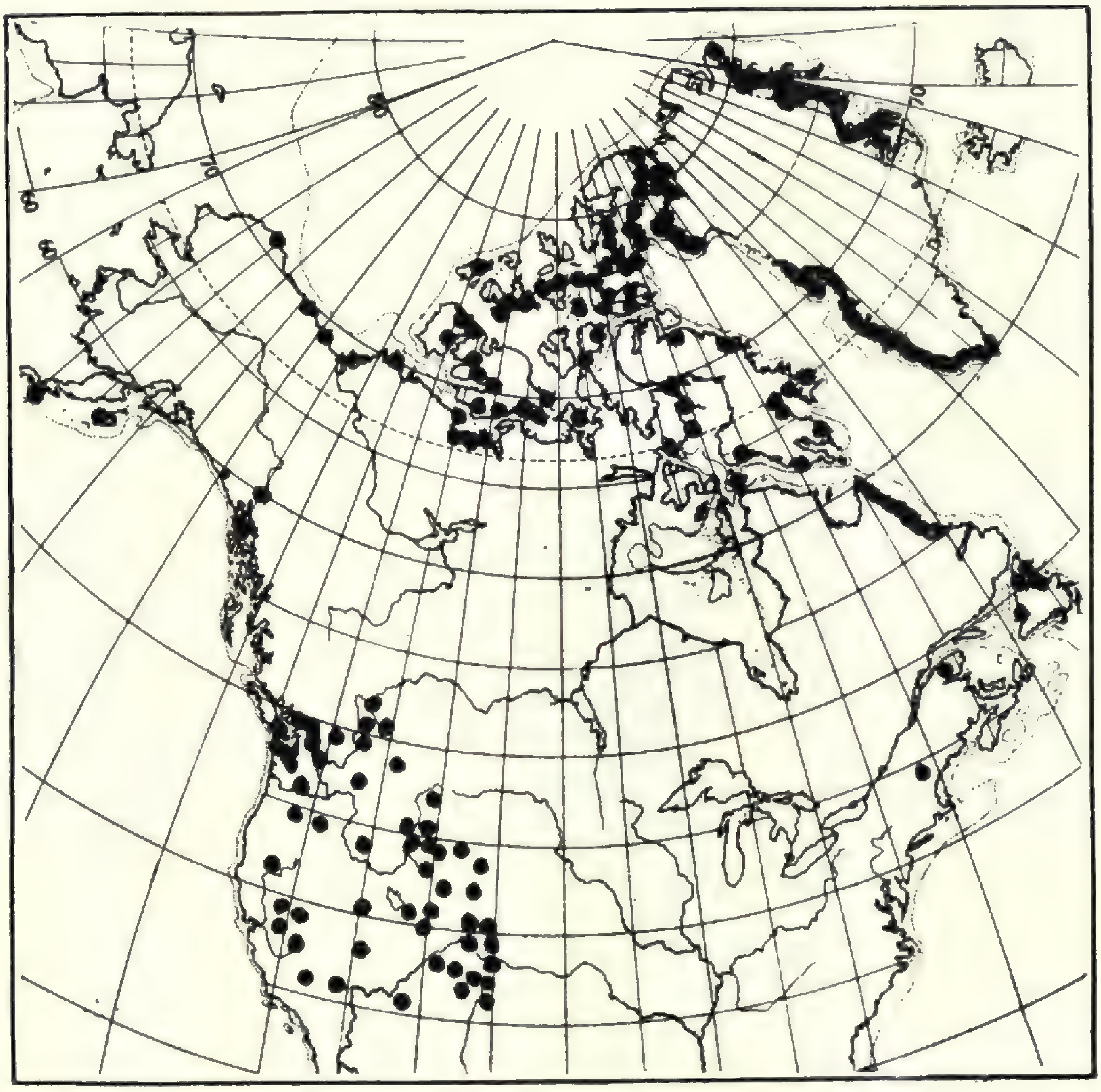
[3] Rhodora, xvii. 9 (1915).

along with many other alluring spots, must wait. A trip up Deer Brook brought a few more northward extensions of range; and another, to the mouths of Middle Brook and of McKenzie River, yielded more colonies of the estuary species, as well as *Plantago major* var. *asiatica*, new to Newfoundland. In the shallow bay at this point Eel Grass, *Zostera marina*, was very freely fruiting, the leaves of the fruiting branches much smaller than on the foliage-branches. All the material in Newfoundland and south along the Atlantic coast seems to belong to *Z. marina* var. *stenophylla* Aschers. & Graeber. Its leaves vary greatly in breadth, from 1.5–6 mm. wide (in dried plants); but they are all coriaceous and opaque, with only 3 (very rarely 5) strong nerves. Var. *stenophylla* occurs northward to southeastern Labrador, locally in southwestern Greenland, in James Bay, in the North Pacific and in northern Eurasian waters. Typical *Z. marina* seems to be the coarser plant of western European (and Mediterranean) waters, with thinner and subtransparent leaves up to 12 mm. wide, mostly with 5–7 strong nerves besides the more numerous finer ones. This larger extreme (typical *Z. marina*) has its counterpart on the Pacific coast of North America, whence it was published as *Z. marina* var. *latifolia* by Morong and as a species, *Z. pacifica*, by Watson. Whether there are good fruit-characters to separate the plants I am at present unable to say, for want of sufficient fruit of the broad-leaved plants of western Europe and of western North America. Should it eventually prove that *Z. marina* var. *stenophylla* Aschers. & Graebn. (1897) is a distinct species, it must be called, by a quite unintentional coincidence, *Z. stenophylla* Raf. Am. Mo. Mag. ii. 175 (1818).

We had originally had Trout River in our schedule; and one day, August 14th, starting from Woody Point for the region of Lomond (near the mouth of Main River), we suddenly perceived that it was absolutely calm outside. There was nothing to do, then, but make a trip southward along the outer wall and to go, while going was good, as far as possible southward along the coast. Passing under Western Head, at the southern entrance to Bonne Bay, we were attracted to the steeple-like pinnacles of diorite which stand like scattered spires (PLATE 237)[1] over the slope—mute evidence that no recent continental ice-sheet has passed over the area, with the inevitable denudation and removal of slender pinnacles. Landing under the nearest, where

[1] This half of plate 237, made from a photograph taken from a throbbing motor boat, is, necessarily, a bit vague. It, however, shows the important physiographic feature.

loose talus poured down the steep slope, we were at once, close to sea-level, in the mixture of Canadian, Hudsonian and Arctic-alpine vegetation already emphasized. Other landings, at the outer base of Western Head and, farther south, on the basalts and the shales near Wallace's Brook, showed the same conditions. Most of the arctic species had been repeatedly collected and, consequently,



Map 11. American Range of OXYRIA DIGYNA.

need be merely suggested (*Carex scirpoidea, Juncus trifidus, Silene acaulis* var. *exscapa, Saxifraga oppositifolia,* etc.); but it was certainly a surprise to find *Oxyria digyna* (MAP 11) abundant at sea-level, a species ranging south from "farthest north" (lat. 83° in Greenland and Ellesmereland), and in Gaspé and New England known only in the most alpine areas. *Luzula campestris* var. *alpina* Gaud., perhaps

better treated as a species, *L. sudetica* (Willd.) DC., was a good addition to the Newfoundland flora; and much of the *Silene acaulis* var. *exscapa* had elongate peduncles (the ordinary plant with flowers subsessile or buried in the leafy tufts). We had great hopes of this plant and collected much material in fruit. It was past flowering and when in anthesis it may prove to be of great interest. For the present we are calling it *S. acaulis* var. *exscapa,* forma *caulescens* (Vaccari) Fiori, a plant not previously recorded in America. On some of the slopes *Hedysarum alpinum,* with lingering flowers, was in fine fruit, as great a display of this elegant plant as we had ever met. *Agropyron* here, as everywhere in Newfoundland, was so perplexing that we collected much material, toward a restudy of the group; and we have a fine series of an *Oenothera* of the *biennis*-group at about its northern limit. One small pocket of *Gentiana nesophila* was all we could find, and there was not a sign of the ordinarily ubiquitous *G. Amarella* and *Halenia deflexa;* and *Euphrasia* was disconcertingly restricted in quantity.

Finally, after Fogg was obliged to leave and Long and I had made the last trips about Bonne Bay, we two sailed for Bay of Islands to connect with the Clarke boat which would sail early in September for Quebec and Montreal. Bonne Bay, which we had originally passed by in our schedule as "all worked out," had proved to be a mine of new discoveries; and we hadn't been on Gros Morne, Gallie's Head, the Peak of Teneriffe, nor the fascinating tablelands to the north, nor the spectacular mountains slightly to the south, about Trout River. Farther south, Chimney Cove, where the invalid Waghorne got choice things, was again unvisited; and we did not see the deadwaters of Main River where grow "every kind of flower." Mr. Preble tried to lure us back the next summer but, unfortunately, although his quite unnecessary bait was most tempting, further expeditions have thus far been out of the question.

Waiting for the steamer to load at Corner Brook, Long and I revisited Hannah's Head and the woodlands along the Humber, where, at the opening of the summer, we had had such "thrills." At the first of September Hannah's Head was excessively dry and no one would guess that beneath the parched crust there were tens of thousands of fine buds of *Botrychium Lunaria.* The autumn plants were on; and *Solidago canadensis,* which seems to be a very rare plant in Newfoundland, was conspicuous. *Lycopodium tristachyum,*

another species rare in Newfoundland, grew in the dry woods and well up on the open rocky slope. At our old station *Orobanche terrae-novae* was ripe, its capsules slenderly lanceolate, as contrasted with the ovoid-conic capsules of *O. uniflora* of the continent.

Early in the summer, while waiting for the "Sagona," Mr. and Mrs. Morris had discovered a turfy slope near Petrie's where most of the *Botrychia* of Newfoundland congregate, and, best of all, they had *Botrychium angustisegmentum* (Pease & Moore) Fern.,[1] a Canadio-Alleghenian species new to Newfoundland. Sunday, September 1, was very rainy, but, determined to get specimens of the latter species, we went in rain-coats and with umbrellas (for we were now packed up and in "store clothes") to the area—*B. simplex, angustisegmentum, matricariaefolium,* in several forms, and *multifidum* (Gmel.) Rupr. (*B. ternatum* var. *rutaefolium*). Not far away were *B. Lunaria* and *B. virginianum* var. *europaeum* Ångström; so that Humber Arm lacks only true *B. lanceolatum* to complete the list of known Newfoundland species.

Part II. Phytogeographic Considerations

When we left Newfoundland we had done nothing we had expected to do and had done many things we had originally planned not to do, discounted at the start as not at all worth while. Nevertheless, we were wholly gratified with the results and our collection of discriminatingly selected specialties (with most of the commonest species uncollected) amounted to nearly 7000 sheets. We had learned anew one humiliating truth: that the best-worked areas, even after weeks of exploration, still need careful study; and we had been especially impressed by three points of large phytogeographic bearing.

The least significant of the three was the complete absence in the summer of 1929 of several annual or biennial species which, in 1924 and 1925, had been everywhere abundant in appropriate habitats. In those years the open limy shores and the barrens near sea-level in northwestern Newfoundland had been brilliant with the biennial *Gentiana nesophila* Holm and *propinqua* Richardson, and the superabundant *G. Amarella.* It was then impossible to avoid stepping upon biennial *Halenia deflexa;* while annual *Euphrasia* in multitudes, both of colonies and of species, colored all turfy slopes. But in 1929 we saw not a solitary individual of *Halenia deflexa* nor of *Gentiana*

[1] Rhodora, xvii. 87 (1915).

Amarella nor *G. propinqua*. The complete absence of these plants was vividly brought home, since I had confidently promised to secure seeds of all variations of *Halenia* for Dr. Caroline Allen, who was monographing the genus. Our failure to find these usually ubiquitous biennials of the region, was, therefore, not due to two of them being on the "taboo-list." *Euphrasia*, too, was a disappointment. The alpine *E. Williamsii* prospered, but the lowland species were very meagrely represented; in fact, *E. purpurea* Reeks, var. *Farlowii* (Robinson) Fern. & Wieg., formerly one of the commonest maritime species of the West Coast, was nowhere seen, nor was *E. stricta* Host, which in the past has been abundant about outer Bonne Bay and St. John Bay; while the usually abundant *E. arctica* Lange, of the upper borders of the strand, was found as only a single small colony. Our station for the biennial *Androsace septentrionalis* on the slope of Tucker's Head yielded exactly two diminutive individuals (we took pains to scatter some seed!). On the cliff at Rivière à la Martre on the Gaspé Coast it can be secured in quantity, as also on the Mingan Islands; in other words, the species usually occurs in abundance.

This fact, that most of the annual and biennial species of the sea-level habitats in northwestern Newfoundland had nearly or quite vanished from the flora in 1929, was very impressive. Certainly we had not diminished them in 1924 and 1925, for neither we nor any other botanists had ever visited any of these special areas, except La Pylaie in 1820, when he recorded and collected not a single *Euphrasia* nor *Gentiana propinqua* nor *Androsace*, and Wiegand in 1910, who did not visit the identical spots. In writing of our visit to Lark Harbor in 1926 (p. 4) I pointed out that there had been no summer, that early in September the snow of the preceding winter remained unthawed in many places. Similarly, we were told, 1927 and 1928 were "summerless" years; 1929, with bright sunshine and some piping hot days, was heralded as the first real summer for four years. We were, apparently, witnessing one of the tragedies of boreal floras. With three successive years when the late-flowering annuals and biennials had been unable to mature seeds, these species had become, at least temporarily, almost extinct; while at least six of them seemed completely to have disappeared. Some of them (*Gentiana nesophila*, *Androsace septentrionalis* and some of the Euphrasias) had barely survived; and one of the most interesting observations to be made on

the next trip to the West Coast is going to be whether or not any or all of these handicapped species have "come back." It requires no great powers of imagination to see why in the Arctic flora annuals are essentially wanting!

The second point of phytogeographic importance concerns the antiquity of the Coastal Plain flora, characterizing the highest "alpine" and treeless tablelands, which form the peaty summit-levels of western Newfoundland, but occurring quite as abundantly on the lowland bog-barrens of southern and central Newfoundland. In discussing, in 1911, this austral or Coastal Plain element in the Newfoundland flora, accepting the then current interpretation of Pleistocene glaciation, I concluded that the Coastal Plain element in the flora and the fauna had reached Newfoundland in post-Wisconsin time from the South, by migration along the then elevated but now submerged Continental Shelf (the northern extension of the true Coastal Plain of the South). Subsequently this interpretation gained additional support by the discovery in Nova Scotia of more than 100 additional Coastal Plain species.

Fortunately, since 1911 the problem of changes along our coast has received some of the attention it deserves and which is certainly needed, if we are correctly to interpret the migrations of plants and animals between Newfoundland and New Jersey. In 1915 the brilliant investigator, the late Professor Joseph Barrell, in a study of *Factors in Movements of the Strand Line and their Results in the Pleistocene and Post-Pleistocene,*[1] enumerated various isostatic factors which must be considered, but the strongest challenge to my interpretation of 1911, that the migration was post-Wisconsin, is contained in the remarkably detailed study of *The New England-Acadian Shoreline* by Professor Douglas Johnson. Johnson's mature conclusions bear so strongly on the problem of migration of the so-called Coastal Plain element in the flora of Newfoundland that I venture to reprint:

Age of Banks Cuesta and Date of Submergence.—The interpretation of the Banks as a coastal plain cuesta receives support from the fact that in the course of their operations on the Banks fishermen bring to the surface fragments of fossiliferous sandstone and limestone. A series of these collected and described by Upham, and determined by Verrill to be of Tertiary age (probably Miocene or even Pliocene), shows that the submergence must have occurred at the end of the Tertiary or still later in post-Tertiary time; for after the deposition of the late Tertiary sedi-

[1] Barrell, Am. Journ. Sci. ser. 4, xl. 1–22 (1915).

ments we must allow time for the erosion of the lowland prior to its submergence. If the bevelled top of the cuesta is the remnant of a peneplane developed on the coastal plain beds (and perhaps also on the crystallines of the oldland), then since the deposition of the late Tertiary formations the land was uplifted, one cycle of erosion completed, another uplift occurred, and in the new cycle maturity was attained before subsidence drowned the resultant topography. Thus we should expect the subsidence to be at least post-Miocene, and more probably post-Pliocene. It should be observed that if the Banks Cuesta is composed in large part of late Tertiary deposits, it is not geologically the equivalent of the principal cuesta farther west. It is, however, quite normal for an inner lowland to be bordered by a cuesta of resistant Tertiary beds in one place, and by a cuesta of resistant Cretaceous beds elsewhere, if the cuesta maker of one locality decreases in resistance at another, or is cut out by an unconformity or otherwise, in such manner as to give at most only a minor cuesta on the inface or backslope of the new major cuesta which replaces the first, due to increased resistance of higher or lower beds in the coastal plain series.

Relation of Banks Cuesta to Former Plant Migrations.—The conclusions here reached are not without interest in connection with an important problem of plant geography. Fernald, developing and extending a conception first stated by Hollick, has shown that many species of plants characteristic of the Pine Barren and Coastal Plain floras of New Jersey and the south occur at various points along the New England and Acadian coasts, and even on Newfoundland. After examining the means by which this coastal plain flora (believed to be incapable of migrating over the oldland which now reaches clear to the sea in New England and the lands northeast) could have reached the far northern localities, he reached the conclusion that the submerged Banks off these coasts must recently have projected far enough above sealevel to give a sandy land-bridge along which the flora could spread freely. Following Daly he appealed to a lowering of sealevel during the glacial epoch to lay bare the crests of the Banks. Barrell pointed out that this would require the migration of the flora during a cold period, whereas the evidence indicates, and Fernald agrees, that such migration must have taken place when the climate was as warm as, or warmer than, that of the present; and he suggested a bulging up of the Banks zone marginal to the ice sheet while the mainland was weighed down by the ice, followed by further uplift as the ice melted and the mainland rose, with a later settling back or subsidence of the Banks as an after-effect of deglaciation.

The submarine physiography of the Gulf of Maine offers striking confirmation of the hypothesis that the Banks were formerly much higher; but it throws no clear light on Barrell's theory of an up-bulging during the glacial period. The inner lowland and cuesta represent a great work of erosion which must have been practically completed before the ice invasion. There seems to be no reason, however, for placing the plant migration so late as post-glacial time. Fernald recognizes the possibility that the plants "migrated northward on the continental shelf prior to the Wisconsin glaciation, and persisted outside the subsequently glaciated area, finally taking possession of their present isolated habitats on the receding of the ice"; and he finds evidence of the existence of "some tract along the coast, especially of Acadia and Newfoundland, which

held this flora . . . continuously through the Pleistocene." In another connection he definitely places the date of migration as "late Tertiary"; and in a letter to the author dated September 28, 1923, he writes: "In regard to the possibility of the Coastal Plain flora migrating to Nova Scotia and Newfoundland in pre-glacial times, there is absolutely no botanical reason, so far as I can see, why this might not have been the case. In fact, there are certain rather striking points which would indicate that a migration in late Tertiary or early Pleistocene times took place." Some of the points referred to in the last quotation are considered in Fernald's later contributions to the subject, published in 1918 and 1921; and his reference in the last paper to an elevation of the continental shelf "since the Pleistocene glaciation" must be read in the light of his other clear statements that the plant migration in question probably antedated the glacial period.

Whatever the later history of the region, the submarine physiography demonstrates the presence of a normal, maturely dissected coastal plain bordering the New England-Acadian oldland at a period which would account for the very early migration of the Pine Barrens flora contemplated in the foregoing quotations. There were then no such broad channels of open water as must have separated certain of the Banks on the theory of a more limited lowering of sealevel due to glaciation; while instead of a temporary land bridge due to bulging at the margin of the glacier there was a long-enduring coastal plain topography extending continuously from New Jersey and southward to beyond Newfoundland. Thus the botanical problen of migration would seem to be measurably independent of changes of sealevel due to glaciation and of marginal bulging due to crustal readjustment under the weight of the ice; although we recognize the possibility that both these factors may have played a rôle in the later history of the Banks Cuesta.[1]

Still other lines of investigation were demonstrating that this migration need not have been a recent one. Dissatisfied with the then current idea, that Newfoundland had been completely denuded by the later Pleistocene glaciations which would have wiped out its flora and fauna, I appealed in 1923 to the venerable and unchallenged student of the Pleistocene, Professor A. P. Coleman, who had already emphasized the lack of glaciation (consequently the antiquity of the relic and endemic flora and fauna) of the alpine area of the Shickshock Mts. in Gaspé. To me the Newfoundland situation seemed identical: conspicuous and unquestioned denudation of the hills in some areas (Burgeo, for instance, PLATE 233); but in others, notably the West Coast and the Long Range, a lack of wholesale denudation by an ice-sheet. In 1926 Professor Coleman published his results, from which I quote pertinent passages (with apologies for such as modesty might require my omitting, except that they demonstrate the importance of phytogeography in the geological problem):

[1] Douglas Johnson, The New England-Acadian Shoreline, 301–304 (1925). N. Y. John Wiley & Sons; London, Chapman & Hall.

All the available geological literature on the subject has been consulted . . . ; but it is interesting to note that the most important work is by an eminent botanist, ... , who, with various assistants, has studied the plants of many parts of the island and has discovered a large number of peculiar, often endemic, species which have survived the ice age. . . . . His latest paper, on the "Persistence of Plants in Unglaciated Areas of Boreal America," . . . must be taken into account by students of the Pleistocene.

. . . .

In most parts of the [Avalon] peninsula the sheet of drift is thin and does not indicate powerful ice action. It seems that the last ice was not heavy enough to depress the region by its weight, since no raised beaches have been reported around the Avalon peninsula. It was thought by Daly at one time that Signal Hill at St. Johns was submerged, but a later study of the hill convinced him that there was no change of level; and this agrees with my own observations on the coast near St. Johns, which failed to show any terraces.

The facts observed seem best accounted for by supposing an early Pleistocene ice cap covering the whole peninsula, followed by a long period of weathering, and then by small local ice sheets of Wisconsin age, which did not unite to form a complete ice cap. If the earlier and heavier ice mass depressed the region seriously any marine terraces formed during the interglacial time seem to have been obscured or destroyed; and the small local ice sheets of the Wisconsin were not sufficient to cause depression.

. . . .

[About Notre Dame Bay] The general impression was that the glaciation was ancient except along the shore of the bay at Lewisporte, where the bowlder clay was soft and fresh looking, with plenty of well-preserved striated stones. It may be that a valley glacier of Wisconsin times moved northward through the bay.

Bishop's Falls and Grand Falls, 20 or 30 miles west of Notre Dame Junction, show hard and ancient-looking bowlder clay, of deep brown color, in which striated bowlders are not infrequent. Exposed ridges of sandstone rise above the till, sometimes as jagged edges which have been deeply eaten by weathering.

To the north of Bishop's Falls great kame deposits indicate a prolonged halt of the ice sheet, and near the harbor of Botwood there are rolling hills of gravel and a few shallow kettles. At the shore of the bay the only evidence of ice action consists of a few bowlders scattered over hills of rhyolite penetrating slaty sandstone of a reddish color. Apparently little work was done by the ice beyond the morainic deposits.

. . . .

The Topsails, about 35 miles farther west, are interesting as hills rising above the highest tableland crossed by the railway, which reaches 1,550 feet a few miles east of Gafftopsail Station. The general character of the tableland does not suggest glaciation, since it is a plain covered with great bowlders of granite and gneiss, just like the underlying bed rock which shows as low bare ridges in places but is usually hidden by coarse and fine granitic débris which seems to have originated in place.

A few striated stones were observed near Gafftopsail Station, but no bowlder clay, only sandy and gritty material. At one place along the railway east of the Station a surface of porphyrite is apparently faintly striated in a north-and-south direction. Gafftopsail Mountain, reaching over 1,700 feet, consists of granite, and a few rounded bowlders of greenstone are scattered over it, showing that it was crossed by ice, though the rough and weathered surface does not suggest glaciation.

The highest point, a few miles northeast, is Maintopsail (1,829 feet). It also consists of coarse, greatly weathered granite, on which rest a few greenstone pebbles and bowlders which must have been transported by ice. There are several small shallow pools on the summit, probably due to differential weathering, with a gritty sand of angular quartz and feldspar on the bottom. The country all around the mountain is strewn with granite bowlders, among which are innumerable pools and ponds of the same kind as on top, sometimes, however, reaching the size of lakes.

The greatly weathered surface of the mountains and of the tableland a few hundred feet beneath suggests that the glaciation was very ancient, probably of Kansan or Jerseyan age; and nothing was seen to indicate a Wisconsin ice sheet.

. . . .

The northwestern side of the [Long] range is much more accessible both by rail and by water and was studied at four points. The first visits were made in 1923 at the suggestion of Dr. Fernald, who had found endemic plants on the range, demanding a much greater lapse of time than the 25,000 or 30,000 years since the Wisconsin glaciation. He had also noted that the surface of the tableland was covered with loose blocks of the underlying bed rock and closely resembled the tablelands of Gaspé and of the Torngats of Northeastern Labrador, which had never been glaciated. His photographs decidedly supported this relationship.

Late in August a climb was made on a tolt, an outlier of the range, which had been used as a hydrographic signal station. It was found by aneroid to be 1,050 feet high, about the level of the edge of Table Mountain, which forms the southwestern end of the Long Range near Cape Ray.

No glacial material was observed on the upper part of the tolt, and its summit consists of loose blocks of granite and gneiss of the same kind as the underlying bed rock. There was no evidence that ice had ever crossed the summit, but the deep U-shaped gorge which separates it from the main range appears to have been carved by a valley glacier.

On the last day of August an ascent was made at Tompkins, 9 miles northeast of the tolt. No signs of glaciation were seen above the edge of the escarpment at 970 feet (aneroid), and a walk of 4 or 5 miles inland over the rolling surface of the table land, reaching 1,908 feet (aneroid), showed only angular blocks of Archaean rock of local origin. No foreign bowlders were found, and the conclusion was reached that the southern part of the Long Range had never been glaciated.

Another ascent made in 1925 at about the same point gave similar results. Angular fragments of Archaean rocks, schists, serpentines, etc., were seen everywhere, but no granites or gneisses which might have come from other parts of the range, and no red sandstones or conglomerates such as ice moving from the Gulf of St. Lawrence must have transported from the plains below.

Another point examined was the table mountain near Port a Port, 20 miles west of Stephenville Crossing on the railway, where Dr. Fernald had reported an unglaciated surface of limestone. Bowlder clay was found up to about 500 feet, but above this there was only bare limestone, and the nearly flat surface at about 1,000 feet (aneroid) was covered with loose fragments of the same rock. At first it seemed that the table had never been ice-covered; but the finding of a few scattered greenstones and granites, much rounded and old-looking, proved that there had been glaciation in the early Pleistocene, though it had escaped ice action in the latest or Wisconsin refrigeration.

Blomidon, appropriately called "Blow-Me-Down" by the local inhabitants as noted by Fernald, 35 miles northeast of Port a Port, at the mouth of the Bay of Islands, consists of serpentine and associated basic rocks. Up to about 1,000 feet red clay with granite or gneiss bowlders was found. Above this a few fragments or small bowlders of granite occur on the weathered surface of serpentine or diorite as for as 1,560 feet. From this to the highest point reached (1,700 feet) only fragments of serpentine or other basic eruptives which might be of local origin were seen, and there was no evidence of glaciation.

Work was done at Bonne Bay, also, about 40 miles farther to the northeast, in the region so well described by Twenhofel, who reported striae on the top of the Bonne Bay table mountain (2,336 feet). His account of the mountain [otherwise] makes it a typical example of an unglaciated serpentine tableland, its surface covered with weathered fragments of the underlying bed rock, and one wonders if there has not been some error in mentioning striated surfaces under those conditions.

Two mountains were climbed near Bonne Bay, one southwest of the village, the other the Gros Morne, some miles to the northeast. The first mountain reaches only 1,263 feet (aneroid), and a few bowlders of granite and of conglomerate occur all the way to the top, proving that it was crossed by ice. The glaciation seems very ancient and weathering has destroyed all evidence of ice action except the rounded bowlders mentioned.

The Gros Morne (2,540) is believed by the people of Bonne Bay to be the highest mountain in Newfoundland. Its gently rolling summit is a tableland of quartzite covered with angular slabs of the same material. A few rounded, much-weathered, bowlders of granite were seen almost to the top, suggesting ancient glaciation; but here, as on other parts of the Long Range, the ice sheet must have disappeared long before Wisconsin times.

The Gros Morne is about midway in the Long Range, and no climbs were made farther northeast, though the narrow, somewhat broken tableland as seen from coasting steamers has the same appearance as the part examined.

Fortunately Dr. Fernald, who covered the region from St. John Bay to Cape Bauld on a botanical investigation in the summer of 1925, has a keen eye for terrain and has sent me photographs and a written description of this northern part of the Long Range, which may be used to complete the account of this little-visited part of Newfoundland.

His observations indicate only slight glaciation, if any, and the photographs show the tablelands, and even some of the lower plains, to be

covered with loose and more or less angular blocks, which could not have been left if there had been Wisconsin glaciation.

. . . .

In the foregoing paper it has been shown that there is evidence in Newfoundland of early Pleistocene glaciation by ice caps which covered all of the island except the southern part of the Long Range, which seems to have remained as an area free from ice on which preglacial plants could survive. It is probable that the Newfoundland ice was really the margin of the Labrador sheet which more or less completely filled the Gulf of St. Lawrence and expanded over all but the highest tableland of the southern part of the island. The retreat of the early ice sheet, which was probably of Kansan or Jerseyan age, was followed by great emergence of the land, especially toward the north.

The effects of the early glaciation have been greatly obscured by later processes, and the ancient glaciated surface is in most places covered with débris and fragments of the underlying rock resulting from long-continued weathering. As a rule the only evidence of the early ice sheets is to be found in rounded erratics of foreign origin lingering unconsumed among the blocks of local origin. Probably hundreds of thousands of years elapsed after the early glaciation before the still fresh bowlder clay and striated surfaces were formed by the less extensive Wisconsin ice sheets.

In one place, at Curling on the Bay of Islands, interglacial materials containing marine shells have been found between two bowlder clays; but elsewhere the time interval is shown only by the profound weathering undergone by the older materials.

The Wisconsin ice probably covered less than half the island and was in the form of small separate sheets or valley glaciers. No proofs of its work have been found above 1,000 feet; and Dr. Fernald has shown that the ice-free tablelands made refuges for plants, so that many cordilleran species and more than eighty related endemic species, developed during the long interglacial period, still survive there.

There is good reason to believe that the southeastern parts of Labrador, as well as the Torngat tableland in the northeast, were not reached by the Labrador ice sheet in the Wisconsin refrigeration, which was much less severe than the earlier one, from which it was separated by a long interglacial time of milder conditions.

In the western part of the island changes of sea-level followed each of the glaciations, corresponding in amount to the thickness of the ice removed and in accord with the theory of isostasy.

The causes of the movements of sea-level in the region have been ably discussed by Daly in "Postglacial Warping of Newfoundland and Nova Scotia," and it is not necessary to take up that very interesting subject here.

The conclusions reached in regard to the glaciation of Labrador and Newfoundland throw light also on the interpretation of Pleistocene events in Nova Scotia, separated from the island only by Cabot Strait.

Goldthwait, in his excellent and very readable "Physiography of Nova Scotia," describes the glacial features of the province and suggests that there is no clear evidence of a recurrence of ice sheets during the glacial period. He has so thoroughly studied the Pleistocene of Nova Scotia

and has so well described the work of ice in that area that one hesitates to oppose his views; but one can hardly help the conclusion that his account of the surface features of the tablelands of Cape Breton Island accords much better with the theory of two glaciations than with a single glaciation, if indeed the higher parts were ever glaciated at all. He described the granite surface as cracked into angular blocks and crumbling into sharp-edged grains of sand; and there are no foreign bowlders found among the weathered débris. There are no striated surfaces on the tableland itself, though striae occur on lower ground near by.

Visits paid by myself to the Mabou tableland near Inverness and to Ingonish Mountain left a strong impression that these elevated regions had never been ice-covered. If ice ever crossed them it must have done so in a very early stage of the Pleistocene.

Fresh bowlder clay with many striated stones can be seen up to about 500 feet on Mabou Mountain, making a striking contrast with the surface above this, where there are loose blocks in place and no sign of ice work was observed. There is an even stronger contrast between the tableland at Ingonish, without a hint of glaciation, and the features of North Sydney, where one finds till with many striated stones and also well-striated surfaces of sandstone under bowlder clay along the railway a mile or two in the direction of Sydney.

The latter features are so fresh that they must be considered Wisconsin; while, if the tableland was ever ice-covered, it must have been at the very beginning of the Pleistocene, so that its effects have been removed by long-continued weathering.

This view is supported by Dr. Fernald's botanical researches, since he finds that some of the cordilleran plants observed in Gaspé and the Long Range occur also on northern Cape Breton Island. It appears, therefore, that all the highlands surrounding the Gulf of St. Lawrence, whether in Gaspé, Cape Breton, or Newfoundland, escaped the Wisconsin glaciation entirely, and in parts were not invaded even by the more extensive ice sheet of the early Pleistocene. They were nunataks not covered by the ice, and served as refuges for species of plants which were destroyed by the Wisconsin glaciation on lower ground. The botanical evidence that plant growth was little, or not at all, interrupted on the high tablelands during the ice age strongly confirms the conclusions reached by a study of the Pleistocene as described in the foregoing paper.

Up to the present there has been very little evidence to show that Eastern North America was invaded more than once by ice. On Long Island the Wisconsin drift sheet rests on two older ones, as noted by Goldthwait; and in New Jersey a very old sheet of till has been recognized; but no general and complete removal of the ice with an important interglacial time has been suggested. The evidence of two glaciations of Newfoundland and Labrador, separated by a long period of weathering, brings the Pleistocene history of the Gulf of St. Lawrence region into line with that of central Ontario, the states of the Mississippi Valley, and the cordilleran region of British Columbia, Washington, and Montana. It is evident that the so-called "ice age" was interrupted at least once by a removal of the ice sheets from the whole of North America; and it is probable that this long and warm interglacial period was world-wide.

The age of the early glaciation cannot be positively determined, since the only interglacial fossils found are Marine shells of still living species,

which are not known from other interglacial deposits. Since the earlier drift sheet is profoundly weathered, a long time of exposure must have separated it from the fresh tills of the Wisconsin; and it has been assumed that the early glacial features correspond to the Kansan or Jerseyan glaciation.[1]

This newer interpretation, that the tablelands of Newfoundland were either unscathed in the Pleistocene or were crossed only in the earliest (Kansan or Jerseyan) stage and not by a Wisconsin sheet, at once opens the way for a closer correlation of the Coastal Plain plant-migration with the demands of Douglas Johnson's conclusions regarding the depression of the banks: that they were depressed in late Tertiary or earliest Pleistocene, not in post-Wisconsin time. Instead of *Schizaea pusilla* (MAP 7) and its associates coming north to Newfoundland from New Jersey in post-Wisconsin, it now seems reasonable to visualize them either as living in Newfoundland throughout the Pleistocene or as having reached Newfoundland in pre-Wisconsin time either from the North or from the South.

Stimulated by the actual field (rather than merely desk-chair) studies of Coleman and of Johnson, I was, naturally, greatly re-impressed by the prevalence in western Newfoundland of the Coastal Plain types on the highest tablelands, where, theoretically, one would look only for boreal species; and, following the subject further, it soon became apparent that these high tablelands have long been (perhaps as far back as the Cretaceous or even the Permian) centers from which the austral element in the Newfoundland flora has radiated to the younger boggy areas of the Island, which were under early Pleistocene (Kansan?) or later Pleistocene (Wisconsin) ice. Happily, while this newer interpretation was in the process of "unconscious cerebration," I was invited to develop for an hour some theme in phytogeography before the Fifth International Botanical Congress, at Cambridge University; and, inevitably, I spoke upon the subject which was then uppermost in my mind. It is not necessary here to repeat the exposition which was published in full in RHODORA,[2] but certain points which especially concern Newfoundland may be emphasized.

The most distinctive elements of the Atlantic Coastal Plain flora of North America are members of groups which, today, are otherwise

[1] Extracts from A. P. Coleman: *The Pleistocene of Newfoundland*, Journ. Geol. xxxiv. 193–223 (1926).

[2] *Specific Segregations and Identities in some Floras of Eastern North America and the Old World*, RHODORA, xxxiii. 25–63 (1931).—Contrib. Gray Herb. xciii., especially pp. 33 et seq.

chiefly confined to the Tropics or to the Southern Hemisphere, including Australia (the *Xyridaceae*,[1] *Diospyros*, the *Halorrhageae*, *Lycopodium carolinianum*, the *Burmanniaceae*, *Drosera*, excluding a few boreal species of § *Rossolis*, etc.); some with great development in the Malayan or the Australian region (or both) but highly localized or wanting in Africa (*Schizaea*, the *Haemadoraceae*, the *Conostylideae*, *Nyssa*); to which, of course, many others could be added. In the Cretaceous (or even in the Carboniferous, in case of some of the Cryptogams) members of the *Schizaeaceae*, *Diospyros* and *Nyssa* (to say nothing of ubiquitous *Lycopodium*) abounded in the Arctic. Thence they spread southward until, due to many Tertiary and later vicissitudes in Eurasia, they were isolated in the Malayan and Australian (and sometimes the tropical or southern African) regions. With Australia severed from its northern connection in the Cretaceous, it is obvious that the eastern American remnants of these and associated groups are very ancient. The great tablelands of Newfoundland are the counterparts of the high Appalachian tablelands of continental North America, the uplifted Cretaceous Peneplane, which, worn down by long erosion-cycles, had, at the opening of Cretaceous time, been reduced essentially to sea-level, where it formed a low plain with sluggish drainage (like the present but geologically youthful Coastal Plain), with Cretaceous seas bounding it to the East, South and West. Only at the North did the baselevelled Appalachian core have a land-connection. That was when the vast northern lands, Laurentia, Baltica and Angara, formed the greater land-mass of the world, with the smaller Amazonia, Ethiopia, Lemuria and Australia separated from the northern continent by extensive seas. Briefly, then, the thesis developed at Cambridge, based largely upon the Newfoundland observations of 1926 and 1929, was, that the baselevelled Appalachian land received the southward-moving plants and that, as the late Cretaceous and Tertiary uplifts carried the Peneplane higher and higher, many species of the primitive sandy and peaty or aquatic habitats died out or found a younger haven in the sands, peats and sluggish waters of the newer Coastal Plain or in the sands, peats and pools which resulted from Pleistocene glaciation. By this newer interpretation, therefore, it is possible to coördinate the presence of these austral types on the uplifted Cretaceous Peneplane of Newfoundland with the findings of Coleman, that on some

[1] Maps of the world-ranges of the groups here noted will be found in the paper above cited.

of the tablelands of western Newfoundland, such as that of Blomidon, "there was no evidence of glaciation," and with the probability pointed out by Johnson, that, instead of being very recent, the submergence of the continental shelf was "at least post-Miocene, and more probably post-Pliocene." The exact time of interchange along the now submerged Tertiary shelf is still not quite clear; that it could have been as early as late-Tertiary now seems fairly settled, though it is as likely to have been in post-Kansan, in the long interglacial epoch (of hundreds of thousands of years) prior to the comparatively trivial Wisconsin glaciation.[1]

(To be continued)

Ectocarpus paradoxus in New England.—It is my pleasure to record the occurrence of *Ectocarpus paradoxus*, Mont., not heretofore recognized in North American waters. It may be merely a waif brought to us by the currents which come to our shores, via Greenland, from Western Europe. But likely it is sparingly established, and has been overlooked by such careful collectors as Drs. Collins and Farlow. It is at home in the Mediterranean, but occurs as far north as Scandinavia (*Kjellman*), whence our specimens probably have migrated. Careful search may reveal it in the warmer waters of New England, where it will be found occasionally intermingled with other algæ.

It has been figured several times. But the most available illustration is in the second edition of Oltmanns, *Morphologie* etc., vol. 2, pp. 10 and 11, where may be found a reproduction of drawings by the lamented Dr. Paul Kuckuck. We may add that these were to appear in a book on the brown algæ, to be issued from the press of Gustav Fischer in Jena. But the death of Dr. Kuckuck, in 1918, left unfinished this monumental work, which was also to treat some of our American forms.

The species named under the title of this note was found at Hale's Beach, North Brooklin, Maine last summer. Three microscope slides have been deposited in the National Herbarium.—R. E. Schuh, Brooklin, Maine.

[1] This newer interpretation received strong support from evidence accumulated in the summer of 1932 in Nova Scotia, evidence so far outside the scope of the present paper that it must be considered elsewhere.

Leavitt's Forest Trees of New England.[1]—This little volume, attractive in flexible red Turkey morocco bind, bearing the seal of Harvard University and published by the Arnold Arboretum, is put forth in the hope that it may both stimulate and to the extent of its very limited scope satisfy curiosity regarding the nature and general significance of trees. While the author states (p. 3) that the book is meant to give to visitors interesting and valuable information about the native trees, the work is neither in any ordinary sense a guide to the plantations of the Arboretum, nor is its purpose, as its title might suggest, a taxonomic presentation of the trees of New England with keys and taxonomic diagnoses.

Its chapters, more than 50 in number, are for the most part little popular essays on subjects connected with tree-life as, for instance, a brief account of the origin and development of the Arnold Arboretum, a sketch of the woods of 1620 embodying some historic data and inferred generalization regarding the trees found by the early settlers, a comparison of the forests of the northeastern parts of our continent with those of the Sierra Nevada and of the Pacific Slope, a brief apology for Latin nomenclature, a simple explanation of the grouping of trees in families and genera, resin and its significance, *Mycorrhiza* and its biological importance.

There follow some chapters or paragraphs dealing in popular style with the leading plant families as illustrated by their most common arboreal elements. Attention is then drawn to the structure and physiological functions of the leaf, the nature of protoplasm, of sap, bark, wood, plant disease, etc.

A chapter on tree geography presents, with the aid of outline maps, some of the leading points in tree distribution.

All these subjects are handled with manifest effort to free them from technicality and even, at times, to present them with a measure of humor, as when the author heads one of his chapters, "What Makes the Elm Tree so Different from the Bull Dog?"

At the end of the little book some 30 pages are devoted to brief, untechnical descriptions of the more important trees of New England, each being illustrated by a half-tone figure of a typical leaf. Naturally certain intricate groups like the willows and hawthorns are passed with mere mention.

The work is obviously intended not for the botanist, but for the layman, and there can be no doubt that it contains for him much that would not previously have come to his knowledge or attention and which would tend to put him into a more observing frame of mind and better touch with nature.—B. L. Robinson

---

Two Segregates in Sporobolus.—The annual species of *Sporobolus*, often known as Poverty Grass, because of their occurrence in thin and dry soils, are currently treated as *S. vaginaeflorus* (Torr.) Wood, with comparatively long spikelets with pubescent lemmas, and *S.*

[1] Robert Greenleaf Leavitt, "Forest Trees of New England." 8 vo. 180 pages and 78 text figures. Boston, Dec. 21, 1932. $1.75.

neglectus Nash, with smaller spikelets and glabrous lemmas, *S. neglectus* occurring, at least in New England, chiefly in calcareous areas. The removal of *S. neglectus* has greatly clarified the group, but *S. vaginaeflorus*, as currently treated, consists of two well-marked varieties, while a plant of the Ozark Plateau with spikelets as long as in *S. vaginaeflorus* has the lemmas quite glabrous. My understanding of this group is briefly expressed in the following key.

Spikelets 3.5–6.5 mm. long; grain 1.7–2.2 mm. long.
  Lemma pubescent; leaves glabrous or essentially so.
    Palea and lemma subequal, about equaled by the glumes. .... *S. vaginaeflorus.*
    Palea prolonged far above the glumes and lemma into a slender beak........ *S. vaginaeflorus*, var. *inaequalis.*
  Lemma glabrous; leaves (especially the lower) papillose-pilose........ *S. ozarkanus.*
Spikelets 2–3 mm. long; lemmas glabrous; grain 1–1.5 mm. long........ *S. neglectus.*

S. VAGINAEFLORUS (Torr.) Wood, var. **inaequalis**, var. nov., a forma typica recedit palea prolongata glumas lemmaque valde superantibus.—Central Maine to southern Ontario, south to Long Island, Wisconsin and Iowa. TYPE: Concord, New Hampshire, September 9, 1901, *F. W. Batchelder*, in Gray Herb.

In New England, at least, var. *inaequalis* is the northern extreme of the species. The northernmost New England specimens seen of typical *S. vaginaeflorus* are from North Berwick, Maine, Exeter, New Hampshire and Willoughby, Vermont. All material seen from farther north in Maine and New Hampshire is var. *inaequalis:* in Maine at Milo (165 miles northeast of North Berwick), Orono and Litchfield; in New Hampshire at Shelburne (100 miles north of Exeter), Concord and Charlestown. The variety extends south through western New England, reaching Long Island (East Williston, September 21, 1899, *J. R. Churchill*).

S. **ozarkanus**, sp. nov. Planta annua *S. vaginaefloro* similis; foliis imis valde papilloso-pilosis; lemmatibus glabris.—MISSOURI: barrens, Webb City, September 8, 1910, *E. J. Palmer*, nos. 3133 (TYPE in Gray Herb.), 3133A; both distributed as *S. pilosus* Vasey.

S. ozarkanus, in its long spikelets, narrow lemma and strongly ciliate sheath-orifices is like typical *S. vaginaeflorus;* but its quite glabrous lemmas and strongly pubescent leaves quickly set it apart. It is, apparently, another of the many endemic species of the Ozark region. *S. pilosus*, to which *S. ozarkanus* was originally referred, is a strong perennial, so closely related to *S. asper* (Michx.) Kunth that

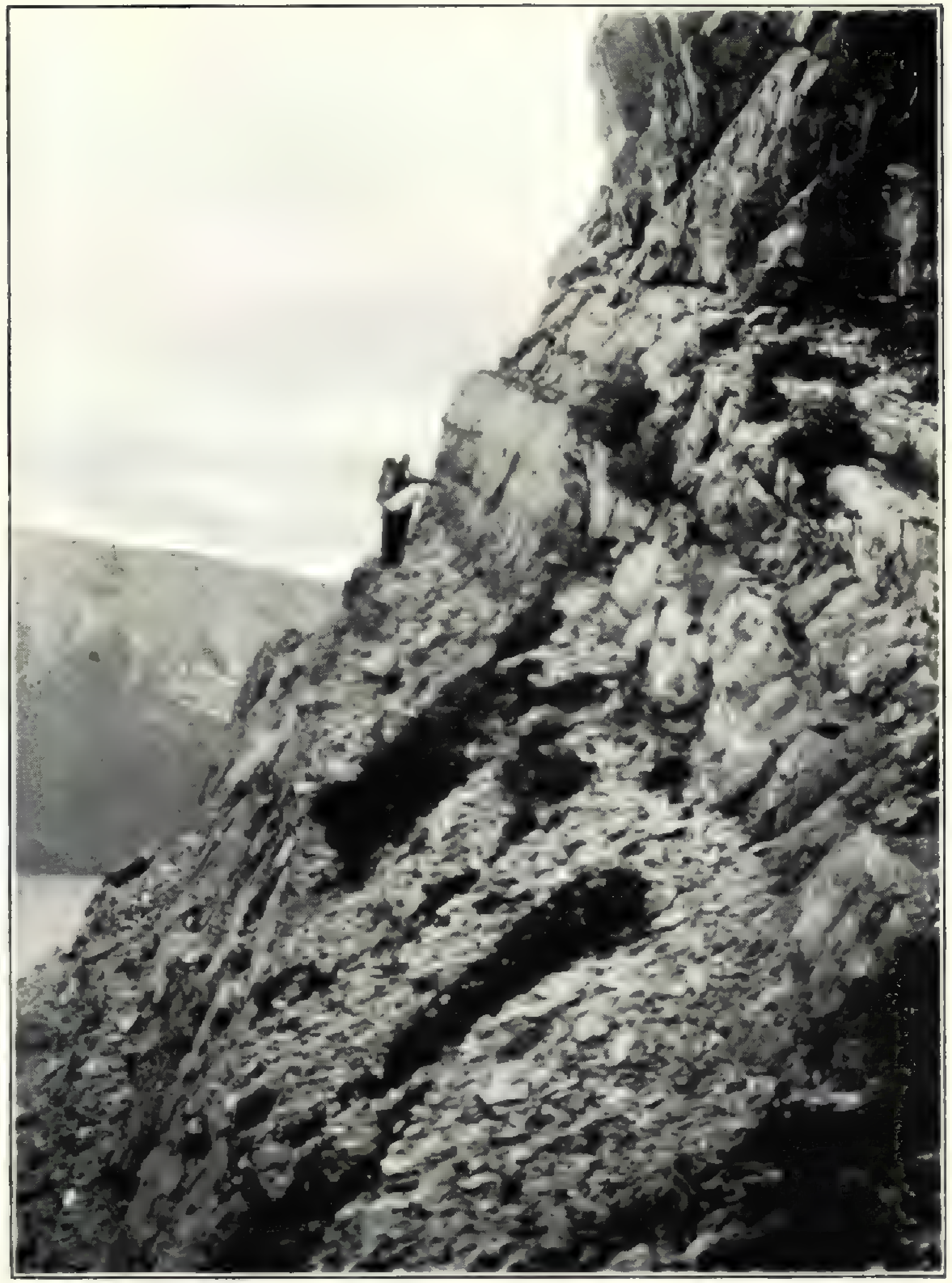
it has been referred by Hitchcock to that species as *S. asper pilosus* (Vasey) Hitchc. Proc. Biol. Soc. Wash. xli. 161 (1928).—M. L. Fernald, Gray Herbarium.

Some Synonymy.—Solanum elaeagnifolium, f. albiflorum Cockerell, Bull. Torrey Club **20**: 410. Oct., 1893. Synonym: *S. elaeagnifolium*, f. *Benkei* Standl. Rhodora **34**: 176. Sept., 1932.

Eustoma Russellianum, f. albiflorum Cockerell, Torreya **24**: 50–51. May–June, 1924. Synonym: *E. Russellianum*, f. *Fisheri* Standl. Rhodora 34: 176. Sept., 1932.—T. D. A. Cockerell, University of Colorado.

[A needless synonym would have been avoided if, in originally publishing *Eustoma Russellianum*, f. *albiflorum*, its author had taken the trouble to indicate it as *new* instead of "long . . . known." The article definitely recorded as newly published "a remarkable new form (**f, flaviflorum** nov.) with clear yellow flowers"; but it gave no intimation that *f. albiflorum* was new and it left doubt as to the author's conception of its rank: "The variety or form of *E.* ***russellianum*** with white flowers (f, *albiflorum*) has long been known." Similarly, *Solanum elaeagnifolium*, f. *albiflorum* was published without any indication that it was new.—Paul C. Standley].

Volume 35, no. 410, including pages 41 to 68 and 4 plates, was issued 4 February, 1933.



Lord-and-Lady Cove, Bonne Bay (*left*). On Tucker's Head, Bonne Bay (*right*).

APR 12 1933

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB

Conducted and published for the Club, by

MERRITT LYNDON FERNALD, Editor-in-Chief

JAMES FRANKLIN COLLINS
CHARLES ALFRED WEATHERBY } Associate Editors
LUDLOW GRISCOM

Vol. 35. April, 1933. No. 412.

CONTENTS:

Identity of Heuchera hispida Pursh.
C. O. Rosendahl, F. K. Butters and O. Lakela 111

Heuchera hispida Pursh rediscovered. *E. T. Wherry* 118

Recent Discoveries in the Newfoundland Flora (continued).
M. L. Fernald 120

Charles Albert Robbins, 1874–1930. *S. F. Blake* 140

Some Weeds in an old Garden. *N. T. Kidder* 145

Moss Flora (Notice). *J. F. C.* 146

Hawaiian Weeds (Notice). *M. L. F.* 146

The New England Botanical Club, Inc.

8 and 10 West King St., Lancaster, Pa.

Room 1001, 53 State St., Boston, Mass.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price, $2.00 per year, net, postpaid, in funds payable at par in United States currency in Boston; single copies (if available) 20 cents. Volumes 1–8 or some single numbers from them can be supplied only at advanced prices which will be furnished on application. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be considered for publication to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than two pages of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

M. L. FERNALD, 14 Hawthorn Street, Cambridge, Mass.

Subscriptions (making *all remittances* payable to RHODORA) to Ludlow Griscom, 8 W. King St., Lancaster, Pa., or Museum of Comparative Zoology, Cambridge, Mass.

Entered at Lancaster, Pa. Post Office as Second Class Mail Matter.

INTELLIGENCER PRINTING COMPANY

Specialists in Scientific and Technical Publications

EIGHT WEST KING ST., LANCASTER, PA.

CARD-INDEX OF NEW GENERA, SPECIES AND VARIETIES OF AMERICAN PLANTS, 1885 TO DATE.

For American taxonomists and all students of American plants the most important supplement to the Index Kewensis, this catalogue in several ways exceeds the latter work in detail, since it lists not only the flowering plants, but ferns and other vascular cryptogams, and includes not merely genera and species, but likewise subspecies, varieties and forms. A work of reference invaluable for larger herbaria, leading libraries, academies of sciences, and other centers of botanical activity. Issued quarterly, at $22.50 per 1000 cards.

GRAY HERBARIUM of Harvard University,
Cambridge, Mass., U. S. A.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. DAY. Leatherette. Pocket size. Invaluable for collector's memoranda and herbarium records. Published and sold by the GRAY HERBARIUM, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

MEMOIRS OF THE GRAY HERBARIUM. A series of illustrated quarto papers issued at irregular intervals, sold separately.

No. III. The Linear-leaved North American Species of Potamogeton, Section Axillares, by M. L. Fernald. 183 pp., 40 plates, 31 maps. 1932 $3.00.

Gray Herbarium of Harvard University, Cambridge, Mass.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3/4 in. 1 year $4.00, 6 months $2.50.

NANISM AT SEALEVEL IN WESTERN NEWFOUNDLAND: FIG. 1, SOLIDAGO MACROPHYLLA; FIG. 2, SENECIO PAUPERCULUS; FIG. 3, SAXIFRAGA OPPOSITIFOLIA; FIG. 4, S. CESPITOSA; FIG. 5, DRABA INCANA.

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 35. April, 1933. No. 412.

IDENTITY OF HEUCHERA HISPIDA PURSH[1]

C. O. ROSENDAHL, F. K. BUTTERS AND OLGA LAKELA

ON the examination of a large amount of material of the genus *Heuchera*, assembled for the purpose of a monographic treatment, the interesting fact appears that there are no reasonably authentic collections of the species currently passing as *Heuchera hispida* Pursh from farther east than the state of Indiana.[2] Since the type of Pursh's species is stated to have come from the "High mountains of Virginia and Carolina," the complete lack of specimens from the whole intervening region, and even from the "type locality" itself at once aroused suspicion. Upon turning to Pursh's original diagnosis, it became apparent at once that what he named and described as *H. hispida* is an entirely different species from the one which has masqueraded in manuals, floras, and even monographs under that name. In order to point out more readily the misconception regarding the identity of Pursh's species, the original description is quoted in full:

[1] Published with aid of a grant to RHODORA from the National Academy of Sciences.

[2] The only apparent exceptions to this statement are the specimens from Dr. Gray's garden, which will be fully discussed later, and a single specimen now in the herbarium of the Missouri Botanical Garden. The latter, which is one of the middle western forms discussed below appears to have been mounted fairly recently, and bears a large label with "George Engelmann, M.D., St. Louis, Mo." printed, and the name "Heuchera americana" apparently in Engelmann's handwriting. It also bears a small and apparently much older label in entirely different handwriting. The data are in almost undecipherable German script, which we interpret as "*Heuchera americana?* Nasswald Meta Ky. Mai 1833." Under the specific name there is pencilled in still a third hand "Richardson?". We cannot pretend to say whether the plant in question really ranges to eastern Kentucky, or whether we have wholly misread the label, or whether perhaps in the obviously long and varied career of the specimen the label may have become mixed.

"H. hispida, scabra; scapo petiolis foliisque subtus glabris, foliis acute lobatis, supra hispido-pilosis dentatis: dentibus brevissimis subretusis mucronatis, pedunculis paniculae pauciflorus, calycibus mediocribus subacutis, petalis spathulatis longitudine calycis, staminibus exertis.

On high mountains of Virginia and Carolina ♃, May, June v. v. Petals purple?"[1]

Up to the time of the appearance of Torrey and Gray's Flora in 1840, no other collections of *H. hispida*, except the ones by Pursh, were apparently known, for in the comments following the description of the species the statement is found, "We are not aware that this species has been collected by any botanist except Pursh (one of whose specimens is preserved in the herbarium of the late Prof. Barton, and another, a very poor one in that of Mr. Lambert) and perhaps by Rafinesque."

Excerpts from Dr. Gray's later writings reveal his keen interest in this obviously rare species of Pursh for in 1841 in his account of a Botanical excursion to North Carolina we find this footnote: "Much to our disappointment we did not meet with *Heuchera hispida*, although I have since learned from an inspection of Barton's Herbarium, that we passed within moderate distance from the place where Pursh discovered it. The habitat given on the original ticket, 'High mountains between Fincastle and Sweet Springs, and some other similar places,' we here cite, with the hope that it may guide some botanist to its rediscovery."[2]

It is interesting to note that two years later Dr. Gray himself happened to become the rediscoverer of the plant as recounted in a letter written to Dr. Torrey on September 30, 1843 from which the following quotation is taken: "I doubt if I got anything of much interest in Virginia except Buckley's (and Nuttall's) Andromeda, Rhamnus parvifolius on the waters of Greenbrier, (where did Pursh get it?), Heuchera pubescens in fruit and Heuchera hispida Pursh!! out of flower and fruit, so that I detected it by the leaves only (and got good roots), not far from where Pursh discovered it, but more west, on the frontiers of a range of mountains where this very local species doubtless abounds."[3]

That Dr. Gray for a number of years regarded *H. hispida* Pursh as a well marked species of very limited range is further evidenced by his comments in 1846 in Silliman's Journal where he wrote as follows:

[1] Pursh, Frederick, Flora Americana Septentrionalis. 1: 188, 1814.

[2] Am. Journ. of Sci. and Arts 42: 16. 1842.

[3] Letters of Asa Gray I: 307, 1893.

"In Giles County soon after crossing the river, live roots of the very rare and distinct species Heuchera hispida Pursh were obtained which have been preserved in cultivation."[1]

From this cultivation four specimens were prepared and preserved in the Gray Herbarium, which, as will be developed later on, appear to be responsible in large part for the rather startling change of heart Dr. Gray experienced between the years 1846 and 1849 regarding the concept and limited range of the species, for in the latter year we find him making the following unqualified assertion concerning its status: "Heuchera hispida Pursh, the rediscovery of which in the mountains of Virginia (in Giles County) I have recorded in Silliman's Journal, second series 1, p. 81, and which I have retained in cultivation in the Cambridge Botanic Garden, is also found in Hancock County, Ill. by Dr. Mead, who has distributed it under the name of H. Richardsonii R. Br.; from which indeed, except that it is a larger and more hairy plant, it does not appear to differ."[2]

In accordance with this broadened concept and in direct contrast with the "scapo petiolis foliisque subtus glabris" of the original diagnosis of Pursh, the species is described in the second edition of the Manual (1856)[3] as being *hispid* or *hirsute*, with long spreading hairs (occasionally almost glabrous). The distribution is given as "Mountains of Virginia. Also Illinois (Dr. Mead) and Northwestward." and *H. Richardsonii* R. Br. is cited as synonym. In subsequent editions of the Manual the range is given as Mountains of Va. to N. C., west to Minn. and E. Kan. In the first edition of Britton and Brown's Illustrated Flora (1897) it is recorded from "Virginia to western Ontario, west to Kansas, Manitoba and the Northwest Territory, south in the Rocky Mountains to Montana and Idaho."

In the monographic treatment of the genus in the North American Flora (1905), Dr. Rydberg rescued *H. Richardsonii* R. Br. from synonymy, and gave its distribution as "subarctic America south to Manitoba, Black Hills of South Dakota and British Columbia." The range of *H. hispida* Pursh was accordingly reduced, still it was accorded a generous territory extending "from Ontario to Assiniboia and Wyoming, south to Virginia and Kansas." Finally in the Flora

[1] Silliman's Journal, Second Series 1: 81: 1846.

[2] Plantae Fendlerianae 4: 55. 1849.

[3] The name does not appear in the first edition as the plant is wholly outside the geographical range of that work.

of the Prairies and the Plains (1932) the distribution is given as "Ont.—Va.—Kans.—Wyo.—Mont." while that of *H. Richardsonii* has become "Man.—S. D.—B. C."

Nothing is known to the authors concerning the present whereabouts of Pursh's "very poor" specimen which Gray saw in Lambert's Herbarium. If it is still in existence it is undoubtedly the type of the species since it was the plant in Pursh's possession when he drew up his description. However, through the kindness of Dr. Francis W. Pennell we have been able to examine Pursh's other specimen cited by Torrey and Gray. This specimen, formerly in Barton's herbarium, is now at the Academy of Natural Sciences, Philadelphia. This, we believe, can be considered as an authentic specimen of Pursh's species. At least Torrey and Gray, who had seen both specimens did not question their identity. The following data are found on the original ticket in Pursh's handwriting: "Heuchera scabra! P. petalis rubris, floribus majoribus. High mountains between Fincastle & the Sweet Springs & some other similar places. P." It is to be noted that the name "hispida" does not occur, but "scabra," the second word in Pursh's diagnosis, does, and Pursh does not use this word in the description of any other species of Heuchera. What caused Pursh to thus alter the epithet and whether he wrote "*hispida*" in place of "*scabra*" on the specimen in Lambert's herbarium are interesting speculations.

Torrey and Gray, enlarging on Pursh's rather brief description, aptly described *H. hispida* Pursh, and their description is quoted here in full: "scape mostly 1–2 leaved, glabrous; radical leaves roundish-cordate, rather obtusely 5–7 lobed, crenate with very broad and short almost retuse mucronate teeth, hispidly ciliate; the upper surface hispid; the lower with the petioles, glabrous, branches of the panicle few-flowered; petals broadly obovate-spatulate, unguiculate, veiny (violet-purple), somewhat longer than the nearly equal calyx segments, a little shorter than the slightly exserted stamens; styles filiform, at length exserted.—Pursh!"[1]

Further, these authors comment: "Resembles the preceding species [*H. pubescens*]; but the flowers are rather smaller, calyx-segments short obtuse. Limb of the petals undulate toward the apex, very broadly spatulate or somewhat rhomboid." This description is so excellent that our only comments are that we think Pursh's

[1] Fl. N. Am. 1: 579–580. 1840.

"staminbus exertis" states the case more accurately than Torrey and Gray's "stamens slightly exserted" (the exsertion amounts to 2–3.5 mm. and this in so small a flower is scarcely slight), that the styles are rather prominently exserted when the flower is in anthesis, and that the flower is about as regular as any in the genus. As thus defined *Heuchera hispida* Pursh is a very local species of the central Alleghenies. Its nearest relative appears to be *H. Curtisii* T. & G. from which it may be distinguished by its broader, undulate-margined petals, and by the hispid upper surface of its leaves. It is in all respects very different from *H. Richardsonii* R. Br., and from the various middle western forms which have been passing under its name, plants with larger, strongly zygomorphic flowers, and for the most part with much hispid hairiness on all their parts.

A very puzzling situation is presented by the four sheets prepared from the plants grown in the Cambridge garden by Dr. Gray. The tickets on two of them bear the following legend: "Heuchera hispida Ph. (1) [or (2)]. The two forms from the same clump. Hort. Cantab. Anno. 1846. e spec Mts. Virg." All the specimens on sheet No. 1 are true *H. hispida* Pursh, while those on sheet No. 2 are entirely different and clearly belong with the so-called *H. hispida* characteristic of the region from Indiana to Missouri and northward to Minnesota. The other two sheets from the Gray Herbarium are dated 1845. Both bear the statement "Hort. Cantab. ex Virginia." Both of them contain a mixture of true *Heuchera hispida* and midwestern forms.

How to account for the appearance of the western form in cultivation in the Cambridge garden in the years 1845 and '46 is indeed a puzzle and the most plausible explanation that occurs to the authors is that either live plants or seeds of the Illinois plant must have been sent to Dr. Gray by Dr. Mead. Dr. Mead's collection was made as early as 1843, the same year that Gray rediscovered *H. hispida* in Virginia, and his specimens contain many ripe seeds. If Dr. Gray planted any of these seeds some may have been washed into the clumps of Virginia plants and have germinated there and Heucheras bloom the second year from seed. At any rate it is quite evident that it was the curious mixture of forms in the garden, and the entire similarity of some of them to Mead's plants which led Gray to expand his conception of *Heuchera hispida* between 1846 and 1849.

All the midwestern plants, which since the publication of Plantae

Fendlerianae have been passing as *H. hispida*, appear to belong to *H. Richardsonii* R. Br.[1] This is a rather polymorphic species of wide range in the western prairies and adjacent regions reaching from western Ontario to the Rocky Mountains, and southward to Kansas, Missouri and Indiana. Southward it appears to hybridize pretty freely into other species. *Heuchera Richardsonii* was described from near the northern limit of its range, "on the rocky banks of rivers from latitude 54° to 64° north." This northern form is characterized by having relatively small leaves 2–6 cm. broad, sparingly hispid or nearly glabrous above, usually more copiously hispid below, especially along the veins. The petioles and stems are glandular puberulent and moderately hispid with short (mostly under 1½ mm.) gland-tipped hairs which are usually nearly wanting toward the base of the stem. This is the plant treated by Rydberg[2] as *H. Richardsonii*, and the range which he gives seems to be essentially correct. It is a plant of the Canadian plains occurring eastward into extreme western Ontario, and westward into the Rocky Mountains, along which it runs south as far as Wyoming. It occurs also in the Black Hills, and in a few stations in the extreme northern parts of Minnesota and North Dakota. It may be called appropriately *Heuchera Richardsonii* var. *typica*.[3]

Southwards in the northern plains states a form of this species occurs with larger leaves, 4–8 cm. broad, and much more copious hispid pubescence, with hairs up to 2.5–3.5 mm. in length. It appears to intergrade completely with the typical form, and no consistent floral differences have been discovered. This is the form which throughout its area has been passing as *H. hispida*. It is a clearly marked geographical variant of *H. Richardsonii*, and as such we are giving it the name *Heuchera Richardsonii* var. *hispidior*.[4] This variety ranges from eastern Montana through the Dakotas and Nebraska to Minnesota, western Ontario, western Wisconsin and

[1] Frankl. Journey 766. 1823.

[2] P. A. Rydberg. North American Flora 22: 107, 1905.

[3] Heuchera Richardsonii var. **typica.** *Heuchera Richardsonii* R. Br., Franklin's Journey p. 766. *sensu stricto.*

We would add as a synonym *H. ciliata* Rydb. Mem. N. Y. Gard. 1: 196, 1900. The floral differences which Rydberg notes as characterizing his species are not significant but occur sporadically in all the forms of the species. Rydberg himself later reduced *H. ciliata* to a synonym of "*H. hispida*" (Flora of the Rocky Mountains and adjacent Plains 382, 1917). The size of leaves, and character of pubescence of his original specimen indicate however that it should be placed here.

[4] Heuchera Richardsonii var. **hispidior,** var. nov. differt a var. *typica* hujus species foliis majoribus, 4–8 cm. latis, petiolis, caulibusque hispidioribus pilis copiosis albis ad 2.5–3.5 mm. longis. *H. hispida* of authors in part, not *H. hispida* Pursh. Type specimen in herb. Minnesota, collected by *O. Lakela* growing in dry soil, Ft. Snelling, Minn., June 14, 1931.

northern Iowa and throughout most of this range it is the only representative of the genus. A full list of the specimens studied will appear in the forthcoming monograph of the genus.

Still farther south and east, in Illinois, Missouri and the adjacent states another variant appears, marked this time by certain slight peculiarities of the floral characters. The inflorescence is somewhat more open, and the flowers a little smaller, while the stamens are more obviously exserted (about 2–3 times the length of the anthers) and the petals are not only glandular, as they are in all the varieties of the species, but are also minutely papillose. In fruit the capsule is somewhat exserted, which is not true of the other varieties. The pubescence is about as in var. *hispidior*, or in some cases even more dense.

This form is probably of somewhat remote hybrid origin. It has much bad pollen, and it forms the first link in a chain of intergrading forms which connects *H. Richardsonii* var. *hispidior* with the western form of *H. americana*. The disposition of most of these forms is left for the monograph now in process of preparation. On account of the wide geographical range of the form now under consideration, and its relatively small divergence from *H. Richardsonii* var. *hispidior* it seems best to treat it as another variety of *H. Richardsonii*. It is the plant which Mead collected in Illinois in 1843, and the plant whose appearance in Dr. Gray's garden in 1845 and 1846 led to the confusion discussed in the first part of this paper. It therefore seems appropriate to call it *Heuchera Richardsonii* var. *Grayana*.[1] It ranges from Kansas to Indiana and northward to central Wisconsin and southeastern Minnesota. In the northern part of its range it intergrades with *H. Richardsonii* var. *hispidior*.

In conclusion, the middle western plants which have been passing as *Heuchera hispida* Pursh are entirely distinct from that species. They are all varieties of *H. Richardsonii* R. Br. These varieties are briefly distinguished in the following key:

1. Capsules included, stamens barely exserted, petals glandular but not papillose
   a. Flowering scapes and petioles moderately hispid with short (1.5 mm. and less) hairs. Leaves 2–6 cm. broad.......................... *H. Richardsonii* var. *typica*.

[1] Heuchera Richardsonii var. **Grayana**, var. nov. floribus 7–9 mm. longis, petalis et glanduliferis et papillosis, staminibus 2–3 plo longitudine antherarum exsertis, capsulis breve exsertis. *Heuchera hispida*, Gray, Plantae Fendlerianae 4: 55, 1849, as to the western forms there discussed and in part of many later American authors, not *H. hispida* Pursh. Type specimen in the herbarium of the Missouri Botanical Garden, collected by *S. B. Mead* at Augusta, Ill. May 1843.

b. Flowering scapes and petioles densely hispid with long (2–3.5 mm.) hairs. Leaves 4–8 cm. broad. *H. Richardsonii* var. *hispidior*.

2. Capsules more or less exserted, stamens obviously exserted, petals both glandular and papillose . . . . *H. Richardsonii* var. *Grayana*.

University of Minnesota.

HEUCHERA HISPIDA PURSH REDISCOVERED[1]

Edgar T. Wherry

During the year 1805 Frederick Pursh collected plants in the Appalachian mountain region of Virginia and West Virginia, a number of which were described as new species in his Flora Americae Septentrionalis, which appeared 9 years later. Among these was a *Heuchera hispida*, stated to have the leaves hispid above but glabrous beneath, the peduncles glabrous, and the flowers medium-sized with purple petals and exserted stamens.[2] Through misunderstanding, subsequent authors came to apply this name to a western plant having the peduncles and lower leaf-surfaces more hispid than the upper surfaces. This situation was recognized in the course of a revision of the genus undertaken at the University of Minnesota by Miss Olga Lakela and Professors Rosendahl and Butters,[3] but on borrowing material from various herbaria they were unable to find a specimen corresponding to Pursh's description in any subsequent collection, except a few of material grown by Gray from roots collected in Giles County, Virginia, in 1843. A Pursh specimen of *H. hispida* is fortunately preserved, however, in the herbarium of the Academy of Natural Sciences of Philadelphia, and the label gives its place of collection as "high mountains between Fincastle & the Sweet Springs." On being advised of these facts in the Spring of 1932, the writer decided to endeavor to rediscover the plant, and as soon as the term's class work was over started on a trip, in company with Professor S. C. Palmer of Swarthmore College.

Leaving Swarthmore, Pennsylvania, on June 9th, we made several stops to collect plants en route, and reached Fincastle, Botetourt County, Virginia, in the afternoon of June 12th. Continuing north-

[1] Contribution from the Botanical Laboratory of the University of Pennsylvania. This account of the incidents of the trip supersedes any which has appeared in newspapers and popular magazines.

[2] Flora Americae Septentrionalis 1: 188. 1814.

[3] Cf. the preceding article.

westward from this town, we took an unpaved but fairly good road which led over higher mountain passes than the modern highway, but found only *Heuchera pubescens* Pursh, a widespread species, between there and Newcastle, Craig County. The main highway running north from the latter place (State No. 22) proved to have been recently reconstructed, and though not yet surfaced was wide and well-graded, so even though night was approaching and clouds could be seen to be gathering along the mountain ridges, we ventured to continue on 11 miles to the summit of Potts Mountain, which was reached about 8 P.M.

At the point where the highway crosses the divide, elevation about 2400 feet, we found an openly wooded rocky flat, and had soon selected a parking place for the night. Then, before making any preparations to retire, we got out our flashlights and started to look around to see if any *Heuchera* might be growing there. The fog was almost impenetrable, but in a few moments Palmer's flashlight beam struck a clump of one of them, and a leaf was soon brought closer to the light. It proved to be hispid on top but not beneath, just as Pursh had said, and the flowers, though just beginning to open, agreed wholly with his description. We had rediscovered, at or near the type locality, the real *Heuchera hispida*, not seen growing there for 127 years, and last seen in the wild, in the county next adjoining on the west, by Gray 89 years before.

The following morning we found two or three additional plants in bloom, and several in bud, along with another member of the genus, the well-known *H. villosa* Michaux, not yet showing its inflorescence.

On descending the north side of the mountain, the *H. hispida* proved to be present down to about 400 feet below the summit. Continuing on toward Sweet Springs, we saw a few additional plants of this species high up on Peters Mountain, in both Craig County, Virginia, and Monroe County, West Virginia. None could be found, however, in any other part of the Appalachians visited, from western Virginia to southern Pennsylvania, so it is evidently endemic in a decidedly restricted area.

University of Pennsylvania.

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. Fernald

(*Continued from page 107*)

Contrasted with the amazingly temperate flora of the peaty tablelands of western Newfoundland, where groups with pronounced austral affinities prevail, there is the abundance at or close to sea-level on the bleak outer coast of western Newfoundland of the arctic and arctic-alpine species. On the exposed coast between latitudes 52° and 48°, from Cape Norman to Cape St. George (and in some cases even southward to Cape Ray), the following members of the flora of the American Arctic Archipelago or of Arctic Greenland (well within the Arctic Circle) occur at or within 100 m. of sea-level. Their latitudinal limits of range on the Atlantic slope of America, as closely as can be determined from the data at hand, is approximately given (omitting fractions of degrees):

Woodsia glabella R. Br. (83°–42°), *Asplenium viride* Huds. (82°–43°), *Festuca brachyphylla* Schultes (82°–44°), *F. vivipara* (L.) Sm. (75°–48°), *F. rubra* var. *arenaria* (Osbeck) Fries (70°–49°), *Poa alpina* L. (76°–47°), *Calamagrostis canadensis* var. *Langsdorfi* (Link) Inman (71°–44°), *C. neglecta* (Ehrh.) Gaertn., Meyer & Scherb. (76°–44°), *Alopecurus aequalis* var. *natans* (Wahlenb.) Fern. (71°–51°), *Hierochloe alpina* (Lilj.) R. & S. (83°–44°), *Eriophorum Scheuchzeri* Hoppe (83°–51°), *Kobresia simpliciuscula* (Wahlenb.) Mackenz. (81°–48°), *Carex capitata* (76°–44°), *C. incurva* Light. (82°–51°), *C. bipartita* All. (76°–49°), *C. glareosa* Wahlenb. (80°–47°), *C. rupestris* All. (81°–48°), *C. scirpoidea* Michx. (76°–43°), *C. glacialis* Mackenz. (79°–48°), *C. bicolor* All. (71°–50°), *C. capillaris* L. (80°–44°), *C. rariflora* (Wahlenb.) Sm. (76°–46°), *C. alpina* Swartz (76°–49°), *C. concolor* R. Br. (81°–44°), *C. microglochin* Wahlenb. (72°–50°), *Juncus trifidus* L. (72°–43°), *J. albescens* (Lange) Fern. (81°–48°), *Luzula spicata* (L.) DC. (76°–44°), *L. campestris* var. *alpina* Gaudin (70°–49°), *Tofieldia minima* (Hill) Druce (76°–48°), *Habenaria straminea* Fern. (69°–51°), *Salix reticulata* L. (73°–51°), *S. arctophila* Cockerell (77°–48°), *Oxyria digyna* (L.) Hill (83°–44°), *Polygonum viviparum* L. (83°–44°), *Arenaria verna* var. *pubescens* (C. & S.) Fern. (83°–44°), *A. cylindrocarpa* Fern. (80°–49°), *Cerastium alpinum* L. (83°–51°), *Lychnis alpina* L. (76°–48°), *Silene acaulis* var. *exscapa* (All.) DC. (83°–44°), *Ranunculus hyperboreus* Rottb. (83°–50°), *R. pedatifidus* var. *leiocarpus* (Trautv.) Fern. (80°–51°), *Thalictrum alpinum* L. (73°–48°), *Cochlearia groenlandica* (83°–51°), *Cardamine pratensis* var. *angustifolia* Hook. (81°–50°), *Draba nivalis* Lilj. (83°–49°), *D. incana* L. (70°–47°), *D. hirta* L. (81°–48°), *D. rupestris* R.

Br. (76°–47°), *Arabis alpina* L. (76°–48°), *Saxifraga cespitosa* L. (83°–48°), *S. aizoides* L. (78°–44°), *S. Aizoon* Jacq. (76°–44°), *S. oppositifolia* L. (85°–44°), *Potentilla nivea* L. (83°–48°), *P. alpestris* Hall. f. (74°–48°), *Dryas integrifolia* Vahl (83°–48°), *Astragalus alpinus* L. (73°–49°), *Epilobium latifolium* L. (83°–48°), *E. lactiflorum* Haussk. (71°–44°), *E. alpinum* L. (73°–46°), *E. Hornemanni* Reichenb. (70°–44°), *Rhododendron lapponicum* (L.) Wahlenb. (81°–44°), *Loiseleuria procumbens* (L.) Desv. (74°–44°), *Arctostaphylos alpina* (L.) Spreng. (76°–44°), *Vaccinium uliginosum* var. *alpinum* Bigel. (81°–44°), *Diapensia lapponica* L. (82°–44°), *Statice labradorica* var. *submutica* Blake (78°–49°), *Euphrasia arctica* Lange (76°–48°), *Bartsia alpina* L. (76°–51°), *Pedicularis flammea* L. (81°–49°), *Gnaphalium norvegicum* Gunn. (72°–49°), *Artemisia borealis* Pall. (76°–48°), *Taraxacum phymatocarpum* (83°–51°) and *Crepis nana* Hook. (70°–51°).

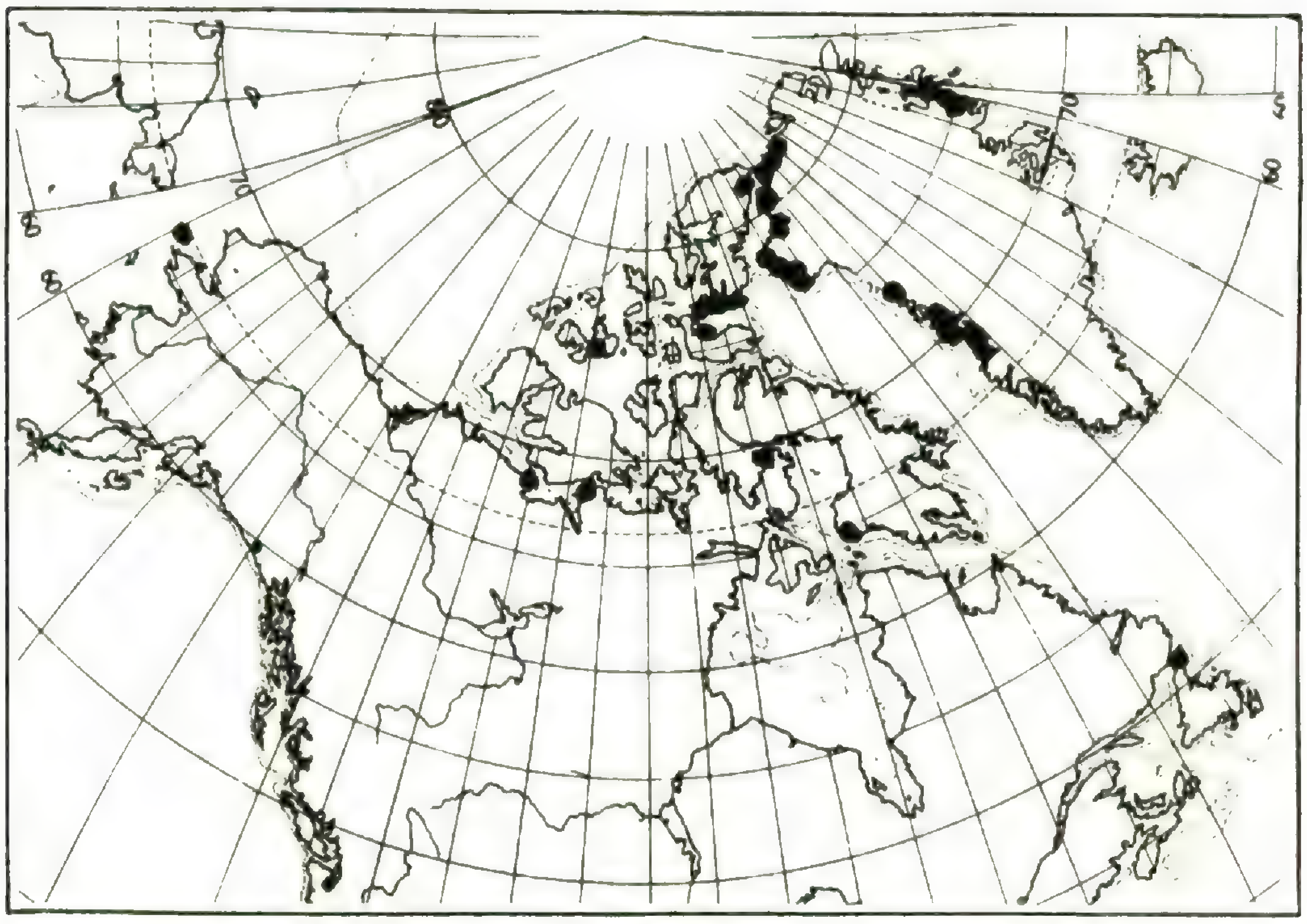
That is a highly impressive list for sea-level between latitudes 52° and 48°, and, were I to include species like *Lycopodium Selago, Scirpus cespitosus* var. *callosus* Bigel., *Stellaria humifusa, Sedum roseum, Empetrum nigrum* and others which reach the New England coast, it would be greatly extended (to 49½ percent of the entire flora of the Archipelago, as enumerated by Simmons). Nor does this arctic flora extend continuously from arctic Greenland or Ellesmereland to western Newfoundland *via* the coast of Labrador. A large proportion of the species are quite unknown on "the Labrador" from Nain (approximately lat. 56°) southward and one or two are not even known from the mountain walls and crests of northernmost Labrador (the Kiglapaits and the Torngats): for example *Taraxacum phymatocarpum* (MAP 12). In describing a dramatic day in 1925 on Burnt Cape (Pistolet Bay), where we first found the Greenland *Habenaria straminea* (unknown between Greenland and northern Newfoundland), I wrote: "When the scattered members of the party assembled at the crest [alt. 223 ft. or 65 m.] . . . I was picking from the crevices a *Taraxacum* which, in its small blackish involucres, was unlike anything we had seen before."[1] I made it out to be the hyparctic *T. phymatocarpum*, known, as stated by Simmons, only in "Northern Greenland, Ellesmereland," but subsequently found southward to lat. 67° in Greenland and lat. 64° on Baffin Island.

Distrusting my own identification, for the species is not known on Labrador, and in northwestern Newfoundland it is within only 223 feet (65 m.) of the sea, I divided the scanty material and sent some to my friend, Dr. Handel-Mazzetti, at Vienna, whose *Monographie der*

[1] RHODORA, xxviii. 103 (1926).

Gattung Taraxacum (1907) had put the genus in order. His reply was wholly corroborative and when, later, I sent a series to the great Stockholm specialist, Dr. Dahlstedt, I also received a similar reply, Dahlstedt referring "No. 29254 ad *T. phymatocarpum* Vahl, verum."[1]

The contrast, then, between the bleak and rocky coastal rim and foreland of western Newfoundland and the peaty tablelands is complete. At both levels the ubiquitous Hudsonian and Canadian types form a generalized background: a forest or scrub of *Picea*



Map 12. American Range of Taraxacum phymatocarpum.

mariana and *P. glauca* Voss, *Abies balsamea*, *Larix laricina*, *Betula papyrifera* and smaller species, *Pyrus* § *Sorbus* and *Populus tacamahacca*, with *Alnus crispa* (or its var. *mollis*), *Salix* (many species), *Ribes glandulosum*, *Viburnum pauciflorum*, *Potentilla fruticosa*, *Lonicera villosa*, etc., with the usual Canadian filicoid and herbaceous

[1] The western Newfoundland and Gaspé collections contain much *Taraxacum lapponicum* Kihlm. In view of the present interpretation of the antiquity of the flora of these areas it was reassuring that Dr. Dahlstedt should write (*in lit.* November 14, 1927): "It has been very interesting to find that *T. lapponicum* (= *T. croceum* Dt.) is distributed also in arctic North America. This collective species . . . is widely distributed in northern and alpine parts of Fennoskandia and occurs also on Iceland and Greenland. It seems to me to be a very old species which surely inhabited the recently covered countries long before the last Skandinavian glaciation."

undergrowth; and the usual Canadian bog plants, with the addition of the almost ubiquitous *Betula Michauxii,* the superabundant *Sanguisorba canadensis* and the usually common *Eriophorum spissum* var. *erubescens* Fern. With this very generalized element almost everywhere, the truly distinctive floras are likely at first to remain masked to the uninitiated; but, once the common run of generally distributed and aggressive species is dismissed from consideration, the flora of the West Coast otherwise quickly segregates into the two contrasted elements which I have sufficiently emphasized: the arctic-alpine dominant at sea-level, the austral dominant on peaty summit-tablelands. The absence or great rarity of many, and often of all, of the Coastal Plain plants at low altitudes from Cape St. George northward is due, presumably, to the extensive calcareous area which makes up most of the lower levels and to the highly magnesian rock of portions of the Lewis Hills and Blomidon and between the North Arm (of Bay of Islands) and Bonne Bay, these furnishing soils toxic, or at least uninviting, to most of the Coastal Plain species. Farther inland and southward, where granitic, gneissic and other silicious rocks prevail, the plants of the acid peats of the tablelands have found welcoming conditions at lower levels, southward even at sea-level.

In an earlier paper, commenting on the close proximity, in some areas, of the arctic and the austral elements in the flora, I said: "In western Newfoundland, similarly, it is quite possible to stand on rock-barrens carpeted with the arctic xerophytes . . . and, by stepping a few feet into the adjacent bogs, meadows, brooksides or thickets, to find one's self in the midst of . . . plants of temperate or even austral range. . . . This intimate commingling of southern species (even Carolinian in some instances) with plants which characterize the Arctic seems, in Newfoundland at least, to be due to the differences of habitat which the two series affect. The arctic types prevail on the dry rocks or on windswept crests, *i. e.* they are primarily controlled in their southern distribution by aridity and bleakness, the climatic features most obviously distinguishing the unglaciated Arctic areas. In describing the climate of the Arctic [American] Archipelago, which, as we have seen, is essentially unglaciated, Simmons says, 'The most prominent and important factor I take its extreme dryness to be,' and this is certainly the most prominent factor in the isolated southern habitats of the arctic plants.

But in Newfoundland, bogs, wet thickets, brooksides and meadows are characterized by southern types and it is in such favorable habitats that all notable extensions [northward] of southern species occur."[1]

Still later, in corroboration of Simmons's statement, that on the American Arctic Archipelago, "The most prominent and important factor I take its extreme dryness to be,"[2] I quoted from Stefansson's *The Friendly Arctic*, Chap. II: "Most of what little snow falls in the far North is soon swept by the wind into the gullies and into the lee of the hills, so that from seventy-five to ninety per cent. of the surface of arctic land is comparatively free from snow at all seasons . . . . a pebble the size of a plum lying on the ground would have more than an even chance of being partly visible above the snow"; and I further wrote: "If a purely botanical demonstration of the rarity rather than the abundance of lakes and swamps [on the unglaciated Arctic Archipelago] were needed an alert phytogeographer would quickly detect it in the absence of freshwater hydrophytes. Simmons admits 204 species of vascular plants to the flora of the Arctic Archipelago, mostly extreme xerophytes, with no true hydrophytes: no species of *Isoëtes, Sparganium, Potamogeton, Callitriche, Myriophyllum* or *Utricularia*. Similarly, all these groups of aquatics were quite unmentioned either in the detailed lists of the floras of arctic Siberia and the Asiatic side of Bering Straits published by Kjellman or in Lynge's very exhaustive study of the Flora of Nova Zembla, an arctic land which was untouched by the different advances of the continental ice-sheets of Europe. But in glaciated Greenland they all occur, there extending northward on the abundantly watered foreland to points varying for the different species from lat. 68° to 72°. Furthermore, the boreal members of the great genus *Epilobium* (excluding § *Chamaenerium*) are typically plants of wet habitats; and, if the Arctic in general were as wet as Campbell and his outgrown sources of information make out, we should expect these wind-dispersed Epilobiums to be everywhere in the Arctic. In wet Greenland they do occur, extending north to lat. 73°, but the Nordenskiöld expedition got none of them on the arctic coast of Siberia (lat. 66°–77°) and Simmons could muster only a single doubtful record for the entire Arctic Archipelago."[3]

[1] Fernald, Mem. Am. Acad. xv. 332 (1925).

[2] Herman G. Simmons, *A Survey of the Phytogeography of the Arctic Archipelago*, Lunds Univ. Årsskr. n. f. Afd. 2, Bd. 9, Nr. 19: 30 (1913).

[3] Fernald, *Campbell's Outline of Plant Geography* (Review), Ecology, vii. 513 (1926)

With the exception of three positive hydrophytes (*Alopecurus aequalis* var. *natans*, *Eriophorum Scheuchzeri* and *Ranunculus hyperboreus*) and a few plants of damp pockets, meadows or shores (*Calamagrostis*, *Carex glareosa*, *bicolor*, *rariflora* and *microglochin*, *Juncus albescens*, *Habenaria straminea*, *Thalictrum alpinum*, *Cardamine*, *Epilobium lactiflorum*, *Bartsia alpina*, etc.), mostly plants of Greenland rather than of the Arctic Archipelago, the truly Arctic species (and their endemic relatives) in Newfoundland are chiefly xerophytes and they are all plants of open and exposed habitats. No better illustrations of the arid condition of this outer coast can be given than the limestone barrens about Old Port au Choix or on Pointe Riche. The vast extent and depth of the long-weathered and superficially arid debris is beautifully exhibited on near-by St. John's Island (PLATE 235).[1]

The coast of western Newfoundland, although fringed late into the spring with ice, which in winter has extended into the Gulf of St. Lawrence or across the Straits of Belle Isle, is not sufficiently cold to be comparable with the true Arctic; and it is decidedly warmer than the north side of the Straits and the outer coast of Labrador, where the south-flowing Labrador current carries icebergs and drift-ice far into the summer. It would seem, then, that the persistence of so extensive an element of the Arctic flora along the outer coast of western Newfoundland is due more to the aridity and the calcareous nature of the exposed ledges and the deep mantle of weathered debris than to low temperature; and that the flora of the rock barrens of the coast of western Newfoundland is largely composed of Arctic species because on these barrens are found arid conditions and calcareous soils comparable with those of much of the Arctic Archipelago where, as Simmons and others before him have pointed out, aridity is "the most prominent and important factor." Since the long-weathered superficial soils have, by continuous leaching, lost much of their alkalinity and have developed carpets of ancient acid peats, oxylophytes, such as *Hierochloe alpina*, *Carex concolor*, *Juncus trifidus*, *Salix Uva-ursi*, *Potentilla tridentata*, *Empetrum nigrum*, *Loiseleuria procumbens* and *Diapensia lapponica*, are not excluded. They, also, are xerophytes and unless the weathered and leached limestones were arid we should scarcely look for them there.

[1] Other illustrations of this arid mantle at sea-level are in RHODORA, xxviii. t. 153, fig. 2 and t. 154, fig. 3 (1926).

The excessive dwarfing and crowding of internodes, as well as reduction of leaves and increase of blanket-coats of trichomes or other xerophytic modifications of high-arctic and high-alpine plants are familiar to every one. In eastern America it is quite unnecessary, however, to go either to the Arctic or to the alpine summits to get the most beautiful illustrations of such nanism. At sea-level in western Newfoundland (in the latitudes of London, Paris, Berlin, Vienna, Winnipeg, Duluth and Vancouver) the arid limestone gravels supply endless fascinating illustrations (PLATES 239 and 240). *Solidago macrophylla*, the woodland species of southern Canada and the mountain woods of the northern states, where it attains a height of a meter or more, wandering out to the dry barrens of Newfoundland, will flower when only 3 cm. high (PLATE 239, FIG. 1). *Senecio pauperculus*, in New England and Pennsylvania often 5 or 6 dm. high and with 15–20 heads, is the tiniest of dwarfs (PLATE 239, FIG. 2) on far-from-rich Pointe Riche. *Saxifraga oppositifolia*, which, on the damp walls of the Green Mts., may trail as broad carpets, with internodes up to 1 cm. long and flower-stalks twice as long, on these arid barrens has densely crowded leaves and sessile flowers (PLATE 239, FIG. 3). On cool and damp walls in western Newfoundland and eastern Quebec *Saxifraga cespitosa* L. often has its tufts (cespites) of leaves lax and elongate (up to 1 dm. long), with the thin and fan-like leaves 2 cm. or more long, with scapes up to 2 dm. high. Not so on the extremest of arid sea-shore barrens of Newfoundland (as at Plum Point) where the mats (PLATE 239, FIG. 4) are positively absurd in their condensation. Willows and birches, which in damp and sheltered thickets reach heights of 1–3 m., on these barrens are absolutely prostrate, with stout and ancient matted trunks and marvellously reduced foliage. *Potentilla fruticosa*, "Widdy," which, on damp barrens of Newfoundland, forms knee-high to waist-high dense thickets, abundant and coarse enough to be used as emergency fire-wood,[1] wanders out to dry barrens and becomes almost unrecognizable (PLATE 240, FIG. 1). *Potentilla nivea*, on damp or turfy slopes of Newfoundland or Gaspé often forming loose mats, with leaflets 2.5–3 cm. long, is forced to struggle on the dry gravels, making wonderful little columns (PLATE 240, FIG. 2) dating back a full half-century (as shown by the marcescent bases of old rosettes) and with tap-roots de-

[1] When I asked a native of Bonavista Bay how they prepare "Widdy" for fire-wood, he replied: "We rips up de whole tree, roots and all."

scending straight down for 3 or 4 dm. So with *Lesquerella* (PLATE 240, FIG. 3), the plants reduced to ancient obconic crowns. The succulent (and edible) Roseroot, *Sedum roseum*, on damp rocks growing strong, with many stems 2–3 dm. high and leaves 2–3 cm. long, can stand hard conditions; but the most arid barrens reduce it to a stature often of only 3 cm. *Draba incana* L., given a good opportunity, grows 3 dm. high, with large scattered leaves; but, like the *Sedum*, it can maintain itself on the driest of Newfoundland barrens by condensation to a height of 2 cm. (PLATE 239, FIG. 5). Seaside Plantain, *Plantago juncoides* Lam. (*decipiens* Barneoud), which in favorable conditions may have leaves 2 dm. long and 1 cm. or more broad, with scapes 2 dm. high and spikes 1 dm. long, is almost too minute (PLATE 240, FIG. 4) to be seen in the dry gravel. *Poa alpina* has the leaves distichous, at least theoretically; but the character is often not easily seen in the lush plants of mountain meadows and wet rocks, plants up to 6.5 dm. high, with broad leaves half as long and pyramidal panicles often 1 dm. in diameter. When, however, *P. alpina* gets into the driest of barrens it cuts out all overgrowth and the strongly marked distichous character of the foliage becomes emphasized (PLATE 240, FIG. 5). *Euphrasia*, too, although annual, responds quickly to the arid habitat. On shores with plenty of moisture *E. purpurea* var. *Farlowii* may be loosely branched and 1 dm. high, with internodes 1 cm. long. On the dry barrens, however, it is content with a full height of 1 or 2 cm.

Already nearly half the known species of the Arctic American Archipelago are known from sea-level in western Newfoundland. In view of the fact that in many cases these species are known only as the rarest of localized relics and in view, furthermore, of the vast extent of unexplored barrens on the West Coast, it should not surprise us if, eventually, practically the complete Arctic American flora is found to grow in this arid section of temperate North America.

Part III. Some Taxonomic Results of Recent Collections in Newfoundland.

In the following notes range-extensions chiefly of considerable magnitude are recorded; and, since it has been imperative to study anew many groups, the revisions of such as are largely represented in Newfoundland are included. Some groups, however, still under revision or awaiting fuller study, are necessarily omitted. Besides our own

collections a few others of special note should be mentioned. Mrs. Sinclair Kennedy (Rachel B. Kennedy) has already reported[1] on some of her discoveries in southwestern Newfoundland; Mrs. George W. Jeffers (Anne M. Jeffers) collected in 1929 about Raleigh, on Pistolet Bay, and added materially to our knowledge of that fascinating region; Mrs. Harold Ayre (Agnes M. Ayre) has been very active on the Avalon Peninsula, where she has added some very striking Atlantic European species to the known flora of Newfoundland; in 1930, Mr. K. P. Jansson spent considerable time in the region of Millertown, near where one of my parties had done extensive botanizing in 1911, and, afterward, in a brief trip to Bonne Bay, he added two species to the Newfoundland flora. Some of the more significant of these discoveries by others are added to our own.[2]

Woodsia alpina (Bolton) S. F. Gray. To the very few Newfoundland stations add the following. Bonne Bay: limestone rocks near crest (alt. 650 m.), Killdevil, *Fernald, Long & Fogg*, no. 1115.

W. glabella R. Br. The following are new stations. Bonne Bay: crevices of limestone cliffs, very scarce, Tucker's Head, and crevice of limestone cliff opposite Lomond, *Fernald, Long & Fogg*, nos. 1117, 1118. Lower Humber Valley: very rare, crevices of dry limestone, Hannah's Head, no. 1116.

Thelypteris noveboracensis (L.) Nieuwl. The northern limit in Newfoundland seems to be at Bonne Bay: boggy spruce thickets near Winterhouse Brook, *Fernald, Long & Fogg*, no. 1125.

T. Robertiana (Hoffm.) Slosson. Apparently more frequent on limestones of the West Coast than previously supposed. The following are the new stations. St. John Bay: wooded talus of limestone cliff, Crow's Head, *Fernald, Long & Fogg*, no. 1129. Bonne Bay: talus of limestone cliffs near Stanleyville, no. 1130; bushy talus of limestone cliff, Lord-and-Lady Cove, no. 1131. Bay of Islands: turf over limestone talus, Druid's (or Raglan) Head, no. 1127; spruce thicket at base of limestone cliff west of Big Barachois, no. 1128. Lower Humber Valley: crevices of dry limestone, Hannah's Head, no. 1126. Plant gummy, aromatic; large plants more than 4 dm. high, with fronds 2 dm. broad.

T. cristata (L.) Nieuwl. A new northeastern limit is the following. St. John Bay: bushy swale back of Eddy's (or Old Man's) Cove, *Fernald, Long & Fogg*, no. 1135. Plants fruiting but very small, up to 2.2 dm. high.

*Athyrium Filix-femina (L.) Roth, var. sitchense Rupr. See Butters, Rhodora, xix. 204 (1917). Collections of 1923, misidentified

[1] *Some Additions to the Newfoundland Flora*, Rhodora, xxxii. 3–4 (1930); *Further Notes from Southwestern Newfoundland*, Rhodora, xxxiii, 207–209, tt. 216, 217 (1931).

[2] In the following notes species not previously recorded from Newfoundland are indicated by an asterisk,

NANISM AT SEALEVEL IN WESTERN NEWFOUNDLAND: FIG. 1, POTENTILLA FRUTICOSA; FIG. 2, P. NIVEA; FIG. 3, LESQUERELLA ARCTICA, var. PURSHII; FIG. 4, PLANTAGO JUNCOIDES, var. GLAUCA; FIG. 5, POA ALPINA.

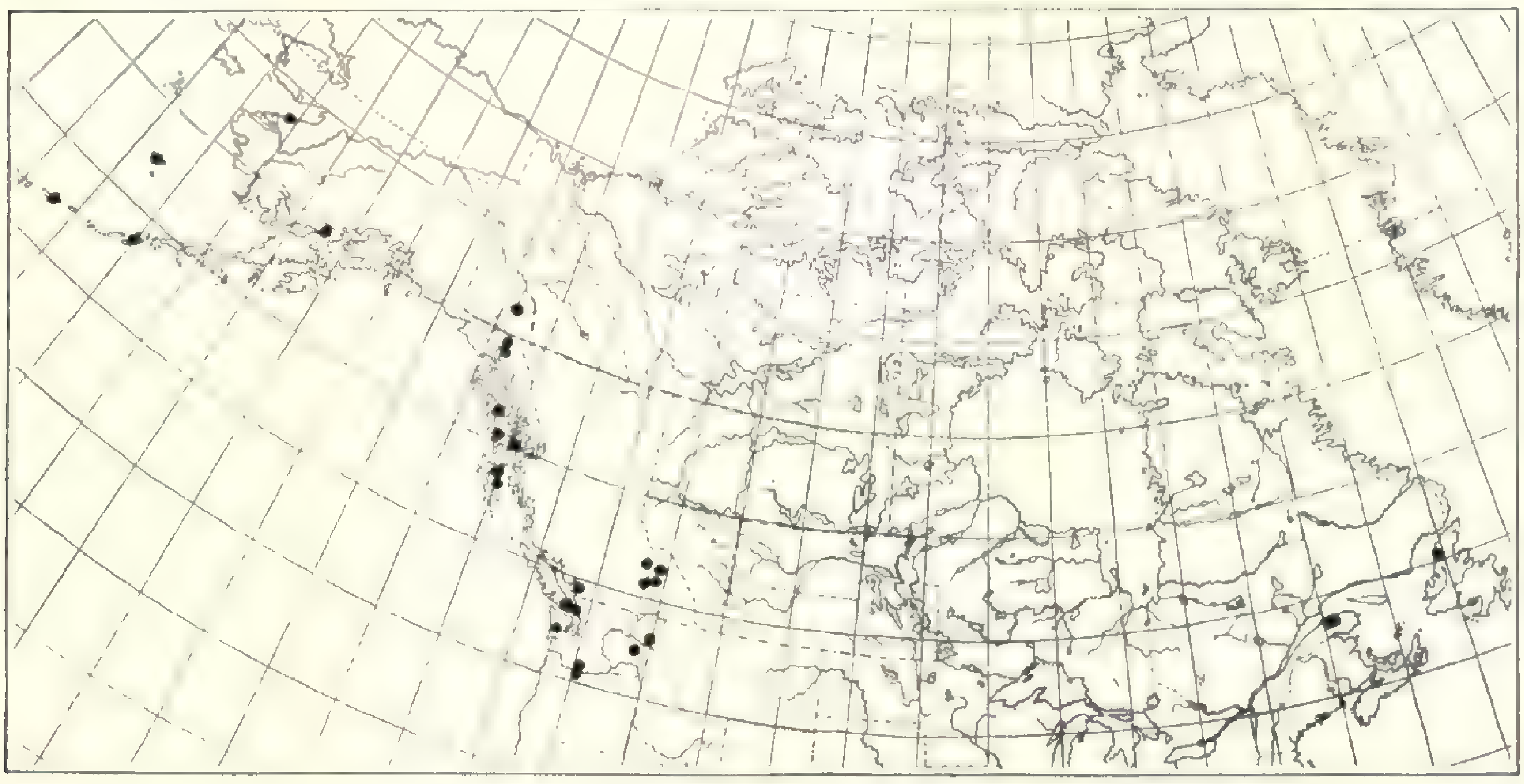
MUHLENBERGIA UNIFLORA, var. TERRAE-NOVAE: FIG. 1, habit, × 1; FIG. 2, spikelet, × 10.

FESTUCA PROLIFERA, var. LASIOLEPIS, TYPE collection: FIG. 3, habit, × 1; FIG. 4, spikelet, × 4.

and distributed as *A. angustum*, var. *rubellum*, prove to be this characteristic plant of northwestern America. The Newfoundland stations follow. HIGHLANDS OF ST. JOHN: thickets below limestone escarpment, western face of Bard Harbor Hill, *Fernald & Long*, no. 27,240; steep springy quartzite banks of brook, Southwest Gulch, Bard Harbor Hill, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 27,241.

The only other stations known in eastern North America are on the Shickshock Mts. of Gaspé and Matane Cos., Quebec. MAP 13.

A. ALPESTRE (Hoppe) Rylands. The plant of Bard Harbor Hill reported in RHODORA, xxviii. 148 (1926) as var. *americanum* seems to be nearer the typical European *A. alpestre* (See Fernald, RHODORA, xxx. 47, 48, tt. 165, 166 (1928)). The following is an addition to the



Map 13. Range of ATHYRIUM FILIX-FEMINA, var. SITCHENSE.

Newfoundland collections there cited. HIGHLANDS OF ST. JOHN: wet quartzite rocks along Yellow Brook, Doctor Hill, *Fernald, Long & Fogg*, no. 1153.

ADIANTUM PEDATUM L., var. ALEUTICUM Rupr. Typical, especially of magnesian rock, near the West Coast. The following are recent new stations. BONNE BAY: wet rocks by waterfall, Shoal Brook, *Fernald, Long & Fogg*, no. 1163; talus of limestone cliff opposite Lomond, no. 1164. BAY OF ISLANDS: wet depressions and borders of rills, serpentine ridge, North Arm, and dry serpentine ridge, North Arm, *Long & Fogg*, nos. 6 and 8; by rill, serpentine ledges, Red Rocks, Lark Mountain, *Fernald*, no. 7.

Typical *Adiantum pedatum* is unknown in Newfoundland, although, through confusion of the French *Capillaire* (*Adiantum Capillus-Veneris*) with the Newfoundland CAPILLAIRE or MAIDENHAIR BERRY,

Chiogenes hispidula of the *Ericaceae*, it has been reported. Thus, Sir Richard Bonnycastle, writing of Newfoundland plants with assurance but with "first-hand unfamiliarity" with them, naïvely stated: "The maiden hair (adiantum pedatum) is a little trailing plant, seeking sheltered places, and is one of the most beautiful of the family of filices, or ferns. It bears a little fruit, white, and like an ant's egg, which contains so much saccharine matter as to be lusciously sweet when made into a jam or preserve. It is occasionally brought to families here by the girls who follow the berry-picking trade; but it is preserved and not used for capillaire, as in Canada [referring to medicinal use of *Adiantum*]."

Botrychium simplex E. Hitchc. Apparently rare in Newfoundland, but more probably overlooked. The following are recent collections. Bay of Islands: dry gravelly slope, Lark Harbor, *Fernald, Long & Fogg*, no. 18; turfy pasture-slope, Curling, *Fernald, Long & Fogg*, no. 1171; sterile turfy slope, Petrie's, *Fernald & Long*, no. 1172.

*B. angustisegmentum (Pease & Moore) Fernald, Rhodora, xvii. 87 (1915). Bay of Islands: very scarce, on sterile turfy slope, Petrie's, *Fernald & Long*, no. 1174, growing with *B. simplex* and *B. matricariaefolium* A. Br.; the station, indicated to us by Mr. Frank Morris, the first east of central New Brunswick. See p. 95.

Equisetum pratense Ehrh. Reported for the first time in Newfoundland in Rhodora, xxviii. 149 (1926), from St. John Bay. Extending south at least to Bay of Islands: thicket near Morley's Pond, *Fernald, Long & Fogg*, no. 1182.

Lycopodium clavatum L. The northern known limit on the West Coast is on St. John Bay: spruce thicket on dry heath-barren southwest of Port au Choix, *Fernald, Long & Fogg*, no. 1191.

L. obscurum L. The northern known limit on the West Coast is on Bonne Bay: dry spruce woods, Island Cove, Main (or East) Arm, *Fernald, Long & Fogg*, no. 1193.

L. sabinaefolium Willd., var. sitchense (Rupr.) Fern. Rhodora, xxv. 166 (1923). The northernmost station known on the West Coast is on Bonne Bay: peaty and turfy upper quartzite slope (alt. 600–650 m., Killdevil, *Fernald, Long & Fogg*, no. 1195.

*L. complanatum L., var. canadense Victorin, Contrib. Lab. Bot. Univ. Montréal, no. iii. 70 (1925). Bay of Islands: peaty and gravelly thicket, French (or Tweed) Island, *Fernald, Long & Fogg*, no. 34.

L. tristachyum Pursh. The northern known limit on the West Coast is in the Lower Humber Valley: dry limestone gravel, Hannah's Head, *Fernald & Long*, no. 1196.

Pinus Strobus L. The northern limit on the West Coast seems to be at Bonne Bay, where, we are told, it has been common on sheltered areas. The extraordinary *f. prostrata (Mast.) Fern. & Weath.,

RHODORA, xxxiv. 168 (1932), occurs on the bleak serpentine mountains of BAY OF ISLANDS: Blomidon, *Mackenzie & Griscom*, no. 10,032; North Arm, *Long & Fogg*, no. 37. See p. 11.

TYPHA LATIFOLIA L. BONNE BAY: bushy margin of open savannah near mouth of Main River, plants all sterile, *Fernald & Long*, no. 1202.

Said by Mr. W. A. Preble to be abundant, and regularly harvested for "flags" in barrel-making, at Baker Brook, 12 miles north of Bonne Bay. See p. 90.

SPARGANIUM MULTIPEDUNCULATUM (Morong) Rydb. See Fernald, RHODORA, xxvii. 190 (1925). To the two recorded stations in Newfoundland add the following. AVALON PENINSULA: 20-Mile Pond (Windsor Lake), *A. M. Ayre*. BAY OF ISLANDS: marshy border of pond at foot of serpentine ridge, North Arm, *Long & Fogg*, no. 42.

POTAMOGETON CONFERVOIDES Reichenb. The northernmost known stations are at BONNE BAY: shallow pools in bog-barrens at 400–550 m. alt., tableland of Lookout Mountain, *Fernald, Long & Fogg*, no. 1206; alpine ponds, July 28, 1930, *K. P. Jansson*. See p. 85.

P. GRAMINEUS L., var. SPATHULAEFORMIS Robbins. To the very few Newfoundland stations add ST. JOHN BAY: shallow marl-pond in limestone barren, Eastern Point, *Fernald, Long & Fogg*, no. 1209.

P. PRAELONGUS Wulfen. To the small number of Newfoundland stations add BAY OF ISLANDS: Morley's Pond, *Fernald, Long & Fogg*, no. 1211. See p. 14.

P. BUPLEUROIDES Fern. The northernmost known station is at the head of BONNE BAY: brackish tidal mud-flats at mouth of Main River, *Fernald, Long & Fogg*, no. 1212.

*RUPPIA MARITIMA L., var. OBLIQUA (Schur) Aschers. & Graebn. See Fernald & Wiegand, RHODORA, xvi. 123 (1914). BONNE BAY: brackish tidal mud-flats at mouth of Main River, *Fernald, Long & Fogg*, no. 1214. See p. 91.

*R. MARITIMA, var. INTERMEDIA (Thedenius) Aschers. & Graebn. See Fernald & Wiegand, l. c. 124 (1914). BONNE BAY: with the latter in brackish tidal mud at mouth of Main River, *Fernald, Long & Fogg*, no. 1215.

Heretofore known in eastern North America only from Rimouski Co., Quebec (Trois Pistoles, *Fernald & Pease*, no. 24,826). See p. 91.

*R. MARITIMA, var. BREVIROSTRIS Agardh. See Fernald & Wiegand, l. c. BONNE BAY: with the two preceding, brackish tidal mud-flats at mouth of Main River, *Fernald, Long & Fogg*, no. 1216.

Heretofore known in America only from pools on the Côte Nord, the Mingan Islands and the Magdalen Islands. See p. 91.

*R. MARITIMA, var. ROSTRATA Agardh. See Fernald & Wiegand, l. c. 125. DISTRICT OF BURGEO AND LA POILE: pool in brackish sand back of Sand Bank, west of Burgeo, *Fernald, Long & Fogg*, no. 47. BAY OF ISLANDS: brook in salt marsh, Lark Harbor, no. 46.

Scheuchzeria palustris L., var. americana Fernald, Rhodora, xxv. 178 (1923). The northernmost known station in Newfoundland is on Bonne Bay: open savannah near mouth of Main River, *Fernald & Long*, no. 1221.

Festuca capillata Lam. As already noted, *F. capillata* is a part of the indigenous flora of southern Newfoundland, already recorded from southeastern and southwestern districts. An intermediate station is in Burgeo and La Poile: dry peaty crests of gneiss hills near Sand Bank, west of Burgeo, *Fernald, Long & Fogg*, no. 57.

Festuca rubra L. This complex species (often treated as several species) is highly developed in Newfoundland. As an aid to identification of these diverse plants the following key to those occurring in eastern America is proposed.:

a. Foliage comparatively soft, not strongly whitened (except in f. *glaucescens*)....*b.*
- *b.* Lemmas glabrous, scabrous or merely strigose-hirsute: panicles up to 2.3 dm. long, often with elongate branches....*c.*
  - *c.* Basal leaves setaceous or linear-involute, 0.5–1 mm. in diameter....*d.*
    - *d.* Basal offshoots all or in great part divergent or decumbent, forming loose mats....*e.*
      - *e.* Lemmas distinctly awned....*f.*
        - *f.* Lemmas glabrous....*g.*
          - *g.* Spikelets 7–10 mm. long, with 3–7 florets: 2d glume 3–4.5 mm. long: body of 1st lemma 4–6 mm. long.
            - Foliage green........................*F. rubra* (typical).
            - Foliage whitish.....................Forma *glaucescens*.
          - *g.* Spikelets 1–1.7 cm. long, with 6–10 florets: 2d glume 4–6 mm. long: body of 1st lemma 6–8 mm. long........................Forma *megastachys*.
        - *f.* Lemmas puberulent or strigose-hirsute......Forma *squarrosa*.
      - *e.* Lemmas awnless or merely mucronate..............Var. *mutica*.
    - *d.* Basal offshoots all erect, intravaginal, with leaves mostly elongate (1.5–6 dm.) and erect: culms tall (2.5–9 dm.) Var. *commutata*.
  - *c.* Basal and cauline leaves all flat, 1.5–3 mm. broad: spikelets 1–1.7 cm. long, 6–10-flowered: body of 1st lemma 5.5–7 mm. long..................................Var. *multiflora*.
- *b.* Lemmas densely villous to lanate: panicle narrow and spiciform or with short branches, 0.5–1.5 dm. long: spikelets 1–1.5 cm. long....................................Var. *arenaria*.

a. Foliage stiff, somewhat wiry, strongly whitened: spikelets 0.9–2 cm. long, 6–10 flowered: body of 1st lemma 5–7.5 mm. long, glabrous..Var. *juncea*.

F. rubra (typical). Turfy, gravelly or rocky slopes and shores, or in mossy bogs and thickets, common (except on the highest summits) throughout Newfoundland. Forma glaucescens (Hartm.) Holmb., not yet noted. Forma squarrosa (Fries) Holmb. (Var. *subvillosa* Mert. & Koch). Bay of Islands: Wild Cove, *Waghorne*, no. 39; cliffs near Frenchman's Cove, *Mackenzie & Griscom*, no. 10,096.

Forma MEGASTACHYS (Gaud.) Holmb. NOTRE DAME BAY: Baccalieu Island, July, 1902, *Sornborger;* shores of Pike's Arm, *Fernald, Wiegand & Bartram,* no. 4662.

*F. RUBRA, var. MUTICA Hartm. Extending from Greenland south to Newfoundland, Anticosti and the Gaspé Peninsula. EXPLOITS VALLEY: railroad gravel, Millertown Junction, *Fernald, Wiegand & Darlington,* no. 4658. HIGHLANDS OF ST. JOHN: springy cliffs and talus above Overfall of Deer Pond Brook, *Wiegand, Gilbert and Hotchkiss,* no. 27,376.

*F. RUBRA, var. COMMUTATA Gaud. (Var. *fallax* (Thuill.) Hackel). EXPLOITS VALLEY: portage route from Depot Camp on Mary Ann Lake to Junction Brook, *Fernald, Wiegand & Bartram,* no. 4661; gravelly bank near Rushy Pond, *Fernald, Wiegand, Bartram & Darlington,* no. 4667. BAY OF ISLANDS: boggy meadows and wet grassy slopes, Birchy Cove (Curling), *Fernald, Wiegand & Kittredge,* no. 2672.

*F. RUBRA, var. MULTIFLORA (Hoffm.) Aschers. & Graebn. AVALON PENINSULA: gravelly railroad bank between Waterford Bridge and St. John's, *Fernald & Wiegand,* no. 4666. HA-HA BAY: strand south of Raleigh, *Wiegand, Gilbert & Hotchkiss,* no. 27,375. BAY OF ISLANDS: woods and thickets on slaty brookside, Curling, *Fernald, Long & Fogg,* no. 1230.

*F. RUBRA, var. ARENARIA (Osbeck) Fries. AVALON PENINSULA: damp mossy or turfy hollows on hill south of St. John's, *Fernald & Wiegand,* no 4664. VALLEY OF GANDER RIVER: dry gravelly bank, Glenwood, *Fernald, Wiegand & Darlington,* no. 4667. BONNE BAY: limestone ledges and talus, Shag Cliff, *Fernald, Long & Fogg,* no. 1233. BAY OF ISLANDS: turfy spots on slaty calcareous talus, Cutwater Head, *Fernald, Long & Fogg,* no. 1231; meadow on Governor Island, *Eames & Godfrey,* no. 5872.

*F. RUBRA, var. JUNCEA (Hackel) Richter. AVALON PENINSULA: rocky soil, base of cliff, Bell Island, Conception Bay, *Howe & Lang,* no. 1283. BONNE BAY: serpentine tableland, Bonne Bay, *Fernald, Wiegand & Kittredge,* no. 2669. BAY OF ISLANDS: gravelly shore, Blomidon Brook, *Mackenzie & Griscom,* no. 10,095. BAY ST. GEORGE: Barachois Brook, *R. B. Kennedy,* no. 37.

FESTUCA **prolifera** (Piper), comb, nov. *F. rubra prolifera* Piper, Contrib. U. S. Nat. Herb. x. 21 (1906). MAP 14.

The alpine plant of the highest mountains of New Hampshire, Maine, Quebec and Newfoundland (as well as lower stations on the limestones of Gaspé, Anticosti and Newfoundland) has never seemed to me like a mere viviparous state of the lowland *Festuca rubra* L., a species which abounds at sea-level and primarily on silicious soils throughout the coastal area from Labrador to New Jersey and even to the Carolinas. Yet, when he published it as a subspecies Piper hesitated to accord it rank higher than a "state" of *F. rubra.*

> The plant of the White Mountains which has been referred to *F. ovina vivipara* L. is in reality a viviparous form or state of *F. rubra*, differing only in its viviparous spikelets. It is said to be the only form of the plant in the White Mountains, and while properly a state rather than a subspecies, may be named as above. It seems surprising that no similar form occurs in Europe.

Since Piper wrote the above paragraph I have had much experience with the alpine plant. In its reddish and membranaceous basal sheaths coarsely ribbed and quickly disintegrating into loose fibers and its usually loose habit of growth, it is certainly nearer to the complex *Festuca rubra* L. than to *F. ovina* L. and the other eastern North American relatives of *F. ovina*, *F. brachyphylla* Schultes, *F. vivipara* (L.) Sm.[1] and *F. capillata* Lam., in all of which the basal sheaths are whitish and coriaceous, scarcely costate and not readily disintegrating. In the latter group of species (Sect. *Ovinae*, subsect. *Intravaginales* Hackel) the anthers are only one-third to one-half as long as the palea; in *F. ovina* 2.5–3 mm. long, in *F. brachyphylla* 0.5–1 mm., in *F. vivipara* unknown, in *F. capillata* 1.5–2 mm. *F. rubra*, however, in its multiform variations has the anthers longer, one-half to three-fourths the length of the palea, in our eastern American varieties 2.5–4.5 mm. long.

Map 14. Range of Festuca prolifera.

Ordinarily the alpine *Festuca prolifera* of calcareous to circumneutral areas does not bear fertile spikelets, but in 1929, on the limestone cliffs about Bonne Bay in Newfoundland, Messrs. Long, Fogg and I were fortunate enough to secure it with the normal simple racemes of viviparous spikelets mixed on some individuals with non-viviparous spikelets bearing anthers. The well developed anthers are only 1.5–2 mm. long; and the well developed lemmas are awnless, either quite muticous or merely attenuate to pointed, but not with awned tips. Similar lemmas are found on all specimens in which they have not

[1] For note on the specific distinctions of *F. vivipara* see Fernald, Rhodora, xxviii· 151 (1926).

changed to leafy tufts and in texture they are decidedly more membranaceous than in *F. rubra*. The latter species, except in rare cases (in which, however, the large anthers are regularly developed) has distinctly awned lemmas. In *F. rubra*, likewise, the inflorescence in all well developed plants is clearly a panicle, with at least the lower branches forking, bearing 9–70 firm spikelets, or in some of the arctic forms with the spikelets closely crowded. In *F. prolifera*, on the other hand, the inflorescence is a simple flexuous raceme of 3 to 8 spikelets, the lowest branch rarely bearing a second sessile spikelet.

With many morphological characters and great constancy and with a very definite restriction to cold or alpine habitats in calcareous or other basic or neutral soils, *Festuca prolifera* seems to be a clear-cut endemic species of eastern North America. In its basal sheaths and loosely cespitose to subrepent habit it is related to *F. rubra*. In its awnless and membranous lemmas and in its almost uniformly proliferous habit it is close to *F. vivipara*, which reaches its southern limit at the northern limit of *F. prolifera* (the Shichshock Mts. and western Newfoundland). In its membranous and awnless lemmas it is similar, also, to *F. brachyphylla*, which extends south to western Newfoundland, the Shickshock Mts. and northern Vermont, but which has the basal sheaths of *F. ovina* and the anthers only 0.5–1 mm. long. In size of anther *F. prolifera* matches *F. capillata* but there the resemblance ceases, *F. capillata* with the sheaths of *F. ovina*, densely cespitose habit, and short coriaceous or chartaceous tightly inrolled lemmas.

Festuca prolifera occurs in two extremes: the typical plant of the White Mountains and the Gaspé Peninsula, as well as southwestern Newfoundland, with glabrous spikelets; and the more northern plant (of midwestern Newfoundland and Anticosti), with lemmas pilose. The two extremes are represented by the following collections.

F. PROLIFERA (typical). Spikelets glabrous.—NEWFOUNDLAND: shelves of limestone cliff, Druid's (or Raglan) Head, Bay of Islands, *Fernald, Long & Fogg*, no. 1235; talus slope of the marble region between Mt. Musgrave and Humbermouth, *Fernald, Wiegand & Kittredge*, no. 2670, in part (mixed with *F. brachyphylla*); dry limestone barrens, upper slopes and tablelands, alt. 200–300 m., Table Mt., Port au Port Bay, *Fernald, Wiegand & Kittredge*, no. 2668 (transition to var. *lasiolepis*), *Fernald & St. John*, no. 10,788. QUEBEC: abrupt western calcareous slopes, alt. 1000–1100 m., Tabletop Mts., *Fernald & Collins*, no. 364; wet rocks and chimneys, alt. 825–1125 m., Northeast Branch of R. Ste. Anne des Monts, Tabletop Mts.,

Fernald, Dodge & Smith, no. 25,433; gravelly and sandy beaches and bars, R. Ste. Anne des Monts, *Fernald & Collins*, no. 415; damp rocks, waterfall of Ouillet Brook, Mt. Fortin, *Fernald & Pease*, no. 24,904; wet calcareous cliffs and ledges, northern base of Mt. Collins, *Fernald, Griscom, Mackenzie, Pease & Smith*, no. 25,431; dry talus and ledges of green schists, alt. 900–1125 m., Hanging Valley, Mt. Pembroke, *Griscom & Pease*, no. 25,432; cold chimneys in the schists at about 900–1000 m. alt., Fernald Pass, Mt. Mattaouisse, *Fernald & Smith*, no. 25,434. Maine: slide, West Wall of North Basin, Mt. Katahdin, July 13, 1900, *Fernald*. New Hampshire: in alpinis Montium Alborum, *Wm. Oakes;* White Mountains, in alpibus cum *Oxyria, Tuckerman;* alpine brooks, Mt. Washington, September 2, 1877, *Pringle* (type-collection); Gulf of Mexico, Mt. Washington, August 5, 1855, *Wm. Boott;* Great Gulf, Mt. Washington, July 29, 1887, *Faxon*, July 7, 1895, *Kennedy, Churchill*, August 10, 1896, *Faxon;* head of Great Gulf, alt. 5500 ft., *Pease*, no. 12,878; Alpine Garden above Raymond's Cascade, Mt. Washington, August 5, 1897, *E. F. Williams*.

*Var. **lasiolepis**, var. nov. (tab. 241, figs. 3 and 4), lemmatibus pilosis.—Calcareous region of western Newfoundland and Anticosti Island. Newfoundland: limestone cliffs near Stanleyville, Bonne Bay, August 9, 1929, *Fernald, Long & Fogg*, no. 1236 (type in Gray Herb., some spikelets fertile); talus of limestone cliff opposite Lomond, Bonne Bay, August 19, 1929, *Fernald, Long & Fogg*, no. 1237; turfy slopes below limestone crests (alt. 650 m.), Killdevil, no. 1238; dry humus over limestone ledges and shingle, Hannah's Head, lower Humber valley, July 12, 1929, *Fernald, Long & Fogg*, no. 1242. Quebec: Rivière Vaureal, Anticosti, 28 juillet 1925, *Victorin, Rolland-Germain & Louis-Marie*, no. 20,578; humus humide sur le calcaire, R. au Fusil, Anticosti, 19 août 1926, *Victorin & Rolland*, no. 24,775; dans l'humus humide calcaire, R. Jupiter, Anticosti, 12 août 1926, *Victorin & Rolland*, no. 24,776 (passing to typical *F. prolifera*); cailloutis calcaires, R. Galiote, Anticosti, 14 août 1926, *Victorin & Rolland*, no. 24,782; sur les platières récentes, avec *Braya humilis*, etc., R. Chicotte, Anticosti, *Victorin & Rolland*, no. 27,872; le long des rivages calcaires, R. de la Chute, Anticosti, 21 juillet 1927, *Victorin & Rolland*, no. 27,884; sur les platières en haut des gorges, R. au Fusil, Anticosti, 20 juillet 1927, *Victorin & Rolland*, no. 27,885.

Poa laxa Haenke. An additional station on the Highlands of St. John: quartzite cliffs and ledges of Deep Gulch, Doctor Hill, *Fernald, Long & Fogg*, nos. 1252, 1253. See p. 58.

P. trivialis L. As stated on p. 83, *Poa trivialis* has every appearance of being indigenous (though sometimes also introduced) in Newfoundland. Near the West Coast it is typical of peaty openings, glades or shores as well as on cliffs and talus or around springy spots.

P. saltuensis Fern. & Wieg., var. microlepis Fern. & Wieg. Rhodora, xx. 124 (1918). The northern limit seems to be on Bonne Bay: woods and thickets near mouth of Middle Brook, *Fernald, Long & Fogg*, no. 1275.

Dactylis glomerata L. In eastern North America the Eurasian Orchard Grass is thoroughly naturalized. Three of the varieties occur with us (two of them in Newfoundland, the third likely to be found there). Typical D. glomerata, common near settlements as far north as Bonne Bay, has the glumes and lemmas with long-ciliate keels but glabrous backs. Var. *ciliata* Peterm. (not yet known in Newfoundland) is similar, but with glumes and lemmas pubescent on the back.

*D. glomerata, var. detonsa Fries. Keels merely scabrous or short-hispid, not long-ciliate. Bonne Bay: swale at old camp-site, mouth of Main River, *Fernald, Long & Fogg*, no. 1276. Probably introduced in hay or straw, and presumably more generally naturalized.

Cynosurus cristatus L.

In his unpublished manuscript, *Essai sur la Flore de Terre-Neuve et des Iles St. Pierre et Miclon,* based on his collections made from 1816–1820, and preserved in the general library of the Muséum d'Histoire Naturelle at Paris, where I had the privilege of consulting it in September, 1930, through the great kindness of the Chief Librarian, Dr. Léon Bultingaire, and his very helpful assistant, Mme. de Mouricaud, Bachelot de la Pylaie seemed to regard *Cynosurus* as indigenous in Newfoundland and the French Islands: "Cette espèce croît à l'ile St. Pierre dans les terrains inférieurs, parmi les autre graminées qui forment des espèces du prairieux naturelles: elle se trouve aussi à Terre-neuve dans semblables localités, le long des ruisseaux et des rivières, au bord des bois." The numerous collections from about the Bay of Islands and from the Avalon Peninsula (*Mrs. Ayre*) seem to be introductions; and Brother Arsène considered it (Rhodora, xxix. 207) an introduction on St. Pierre et Miquelon.

In the same manuscript La Pylaie recorded *Molinia caerulea (L.) Moench as a native of boggy barrens near the West Coast, saying (under *Melica caerulea* L.): "Cette plante croît dans les landes dures et marécagueses qui se trouvent sur la côte occidentale de Terre-neuve, à une certain distance du rivage: elle est rare. . . La plante ne diffère pas de celle qui croît en Europe." As yet this rare species has not been rediscovered in western Newfoundland but the habitat is right for *Molinia,* which should confidently be sought.

Catabrosa aquatica (L.) Beauv., var. **laurentiana,** var. nov. (tab. 242, figs. 3 and 4), foliis caulinis subacutis vel obtusis nec apice rotundatis; culmo valde grosseque sulcato; paniculis contractis lanceolatis vel anguste ovoideis 2–16 cm. longis 1–8 cm. diametro, internodiis imis 0.7–3 cm. longis, ramis horizontaliter patentibus ad

basin versus floriferis; spiculis ochroleucis vel purpurascentibus 1–2-floris; lemmatibus 2–3 mm. longis.—Springs, rills, pools and fresh to brackish marshes, near the coast, southeastern Labrador, Newfoundland, southeastern Quebec, Magdalen Islands, Prince Edward Island and northeastern New Brunswick. LABRADOR: Seal Islands, 1900, *E. B. Delabarre.* NEWFOUNDLAND: swaley margin of pool in limestone barrens, Capstan Point, Flower Cove, *Fernald, Long & Dunbar*, no. 26,286; turfy and gravelly beaten paths (stunted individuals), Flower Cove, *Fernald & Long*, no. 27,434; borders of springs at foot of limestone sea-cliffs, base of Pointe Riche, *Fernald, Long & Fogg*, no. 1277; wet runs and boggy spots in limestone barrens, near sea-level, Ingornachoix Bay, *Fernald, Wiegand & Kittredge*, no. 2601; boggy brooklet, Channel, *Howe & Lang*, no. 811; cold spring-ditch, Port aux Basques, *Fernald, Long & Dunbar*, no. 26,285. QUEBEC: wet places, Blanc Sablon ("Labrador"), *Fernald & Wiegand*, no. 2600; springy marsh near the shore, Harrington, *St. John*, no. 90,142; sur les rivages calcaires, Pointe-aux-Ammonites, *Victorin & Rolland*, no. 18,225; rivages du lac Salé, Ile à la Chasse, Archipel de Mingan, *Victorin & Rolland*, no. 25,881; le long de la petite rivière, Pointe de l'Est, Anticosti, *Victorin & Rolland*, no. 27,800; cold brook at edge of salt marsh, Ste. Anne des Monts, *Collins & Fernald*, no. 28; border of salt marsh, Capucins, July 28, 1922, *Fernald & Pease*, no. 24,867 (TYPE in Gray Herb.); abundant in a cold brook, mouth of Bonaventure River, July 31, 1902, *Williams & Fernald;* August 2, 3 & 4, 1904, *Collins, Fernald & Pease;* springy holes at edge of salt marsh, Bic, *Fernald & Collins*, no. 872; brackish shore, Cacouna, *Victorin*, no. 595; shore of St. Lawrence, Temiscouata, August 7, 1879, *Pringle;* vicinity of Cap à l'Aigle, *J. Macoun*, no. 68,967. MAGDALEN ISLANDS: brook in springy marsh and wet sand, Grindstone Island, *Fernald, Bartram, Long & St. John*, nos. 6882, 6883; sur les dunes humides, Ile du Hâvre-au-Ber, *Victorin & Rolland*, no. 9040. PRINCE EDWARD ISLAND: cold springy shore, Southport, *Fernald & St. John*, no. 6881; spring-fed marsh, Southport, *Fernald & St. John*, in Pl. Exsicc. Gray. no. 121. NEW BRUNSWICK: fresh to brackish marshy ground, Dalhousie, *Fernald & Pease*, no. 24,868.

I am unable to place the plant of cold springs, rills and pools in eastern Canada, Newfoundland and Labrador with any of the described variations of *Catabrosa aquatica.* The aggregate species has a wide range across Eurasia, north to subarctic regions; in western North America, from Alaska to the Saskatchewan, south, chiefly in the mountains, to Arizona, Colorado and Nebraska; and borders of the Gulf of St. Lawrence and the Straits of Belle Isle. In the latter area, where the plant abounds in cold waters near the fisheries, it might easily be taken to be a recent introduction from Europe, especially as it is as greedily eaten by the cattle as the European plant

and, apparently, spread by them to wet cowtrails and roads some distance from the pools in which it truly luxuriates. So generally have we come to associate the grass with the cattle-infested areas, where it is difficult to secure good specimens, that frivolous and classical members of my parties have nicknamed it "Cattlebrows'er,"[1] the name *Catabrosa* itself referring to the erose or *nibbled* margins of the glumes and lemmas.

Var. *laurentiana* is nearer to *Catabrosa aquatica*, var. *uniflora* S. F. Gray, than to other varieties of the species. Typical *C. aquatica* is apparently the large European plant with the cauline leaves rounded at tip; the panicles very long (mostly 1–2.5 dm. long), with delicate capillary whorled branches up to 1 dm. in length, whence one of the English names, WATER HAIR-GRASS. In the well developed panicles (1.5–2.5 dm. long), shown in FIG. 1, the lowest whorls are 3–6 cm. apart, the longer branches (4–10 cm. long) are spikelet-bearing chiefly above the middle and until very mature are slightly ascending. The spikelets are 2 (sometimes 3 or 4)-flowered. The culms (just above the

[1] I realize that, in putting on record such pleasantries, which often relieve the monotony of "changing driers" and of "salivating" specimens, there is danger of being wholly misunderstood by those who lack the "Yankee sense of humor." At least, when I recorded one of our bits of botanical humor in 1926 the effort fell flat. Writing of *Carex microglochin*, "one of the rarest and taxonomically most interesting of species, having the primitive rachilla, which is obsolete in most modern *Carices*, projecting from the tip of the perigynium," so that it is "about as well placed in the Antarctic genus *Uncinia* as in the great genus *Carex*," I wrote, in would-be humorous vein: "Consequently, when we first came upon this unpretentious but truly aristocratic plant, scattered and rare as we felt it ought to be, we carefully dug the individuals and gently tucked their bristly tops into paper bags that we might lose none of the precious fruits; at that stage we spoke of it by its full name, *Carex microglochin*, and had a feeling that we ought to give it some title. A little later, finding it more common than the few straws in herbaria could possibly suggest, we began to feel familiar and called it 'Mike'; then, as the weeks wore on and we saw it in every low place in the lime-barrens, we referred to it as 'Mike O'Glochlin;' and before we had left the Straits Coast, noticing that it followed many paths where its prickly little fruits had obviously been spread by pedestrians with their high skin-boots, our attitude had completely changed and we spoke of it as 'Mike O'Glochlin, the Bootlegger'."—Fernald, RHODORA, xxviii. 61 (1926).

This was intended as an obvious joke; but the greatest humor in the series was reached only when the matter was re-served by the most prominent of British local botanists, my friend, the late Dr. Druce of Oxford, whose remarkable array of degrees and honors (M.A., D.Sc., LL.D., F.R.S., F.L.S.) bespoke his botanical reputation: "At Capstan Point they found a wonderful Arctic flora which included the 'excessively local relic-species' having the primitive rachilla, which is almost obsolete in modern sedges, projecting from the top of the perigynium. They familiarly called it 'Mitre Oglochin,' noticing that it had been spread along many paths by the high skin boots of pedestrians to which the prickly little fruits had become attached."—Druce. Bot. Soc. Exch. Cl. Brit. Isl. Rept. viii. 339, 340 (1928). The fishermen of the Straits of Belle Isle are not bishops, although my characterization of *Carex microglochin* as "truly aristocratic" may have created the impression that it frequently associates with "mytrede bisshopes."

upper leaf) are closely and shallowly furrowed (FIG. 2). Var. *uniflora* (var. *subtilis* Hook.), as shown by Lange, Fl. Dan. xvii. fasc. li. 3, t. mmmii. fig. 2 (1883), and by many European specimens (see FIGS. 5 and 6), is very similar to the newly proposed var. *laurentiana* in having the cauline leaves narrowed to tip, the culms coarsely furrowed, the panicle comparatively small and the spikelets mostly 1-flowered; but the panicle is lax and open as in typical European *C. aquatica*, with the branches subascending until mature. The Rocky Mountain representative of the species (FIGS. 7 and 8) seems to be var. *uniflora*.

(*To be continued*)

CHARLES ALBERT ROBBINS, 1874–1930

S. F. Blake

Charles Albert Robbins was a worthy member of the widely scattered band of amateur botanists who, without the advantage of early scientific training, by a combination of enthusiasm and perseverance have contrived to master their chosen fields and make substantial contributions to botanical knowledge. Equipped with only a common school education, and compelled to devote practically the whole of his life to business, Mr. Robbins nevertheless succeeded in bringing together what is doubtless the largest private collection of *Cladonia* ever formed in this country and in obtaining recognition as the best-informed student of that genus whom America has produced. It is a matter for deep regret that his untimely death at the age of 55, almost immediately after his retirement from business had afforded the leisure for study he had so long desired, has deprived us of the more matured works of wider scope which might confidently have been expected from him.

Charles Albert [Sumner] Robbins was born in Stoughton, Massachusetts, on 9 February 1874, the son of Charles Orlando and Rosella Robbins. Both his parents were natives of Maine, his father's branch of the Robbins family being descended from one of three brothers from England who settled at an early date in Maine, Cape Cod, and Rhode Island respectively. After a grade school education Mr. Robbins entered the grocery business, at first working in Stoughton. In the early 'nineties he moved to Onset, a well-known summer resort section of Wareham, Massachusetts, where he lived for the rest of

his life. For nearly thirty years he conducted a grocery and provision business there in partnership with Arthur B. Hammond, retiring from it after the death of Mr. Hammond, and only about a year before his own death. In 1897 he married Nellie Barnard of Onset. Mrs. Robbins entered fully into her husband's interest in natural history, and accompanied him on nearly all his field trips. On their last excursion to New Hampshire, in October, 1929, Mr. Robbins had trouble with an infected tooth, and on their return to Onset it was found that his aorta was infected. After several months of sickness he died on 22 January 1930, from a combination of angina pectoris and infected aorta, and was buried in the "Neighborhood Cemetery" in East Wareham. Besides his wife, he was survived by two sons, Lloyd and Bruce, his father (since deceased), and a brother. His mother had died only a month before him.

From his parents Mr. Robbins inherited a love of the out-of-doors, although this acquired no definite direction until he was about 30 years of age. About that time his lifelong friend Ernest M. Fullerton of Stoughton aroused in him an active interest in the field study of birds which he kept until the close of his life. Through this interest he came into contact with other students of birds in eastern Massachusetts—Outram Bangs, William Brewster, Walter Faxon, Dr. W. M. Tyler, J. B. Norton, and others,—and with them he made many trips. In the winter he was accustomed to distribute food for the birds in the vicinity of Onset, usually accompanied on such trips by his friend Frank Robbins (not a relative). He was in no haste to publish his observations, and his printed notes on birds, aside from an article on the breeding habits of the piping plover and another on the method of feeding of the red crossbill as studied in a captive bird, are confined to a single short note in the "Auk," several Christmas censuses in "Bird-Lore," and some short articles in a local newspaper. His longest paper, which remains in manuscript, was an annotated list of the winter birds of Wareham containing the names of 103 species.

The interest in *Cladonia* which absorbed the last fifteen years or more of Mr. Robbins' life was awakened in him as a child by the observation of the beautiful scarlet-fruited species, *C. cristatella,* which is so common on decaying stumps and earth throughout New England. When he began seriously to collect lichens about 1915, however, he did not confine his attention to Cladonias, but studied also the arboricolous forms so abundant in Wareham and its vicinity.

At first, for lack of a satisfactory manual, he was compelled to rely on others for the identification of his specimens, particularly Dr. L. W. Riddle, of whose assistance he always retained a grateful memory. As his herbarium of named specimens grew and as his explorations showed him the wealth of Cladonias in his region and the incomplete state of knowledge concerning them, his interests gradually centered on that genus, and by about 1920 he was devoting himself almost entirely to its study. Shortly before the death of Dr. Riddle Mr. Robbins entered into a correspondence with G. K. Merrill, the well-known lichenologist of Rockport, Maine, which continued for five years. Mr. Merrill's identifications and critical notes were of great assistance to Mr. Robbins in the early years of his study, but as his own familiarity with the genus increased differences of opinion arose,—Mr. Robbins estimating the work of Wainio and Sandstede much more highly than did Mr. Merrill,—and their correspondence was broken off abruptly by Merrill in 1925.

Although Mr. Robbins sent a few specimens indirectly to Wainio, the monographer of *Cladonia*, and obtained identifications of them, his principal European correspondent was Heinrich Sandstede of Bad Zwischenahn, Oldenburg, with whom the interchange of specimens and opinions was as easy as it was difficult with Wainio. Their correspondence, begun in 1922, continued practically to the end. To him Mr. Robbins was accustomed to send especially difficult specimens collected by himself or his correspondents, and from him he purchased in 1923 the first eight fascicles (nos. 1–1086) of Sandstede's "Cladoniae exsiccatae." He contributed a number of sets of 40 specimens each to later distributions, receiving in return the fascicles as issued as well as a set of Arnold's beautiful photographs of types and historical specimens of Cladonia.

The vicinity of Wareham with its sand plains, pitch pine woods, and cranberry bogs is rich in Cladonias, and Mr. Robbins found there a fruitful field for his labors. He described three new species and numerous forms from that region, and another species was described from his collections by Wainio. Always pleased to place his knowledge of the genus at the service of others, he rendered much assistance to Dr. Alexander W. Evans in the latter's work on the Cladonias of Connecticut and of North and South Carolina, and many of his new forms have been or will be published by Dr. Evans in his papers on the Cladonias of those regions. He named also the specimens of the

genus collected by A. F. Allen[1] in Quebec, describing from them a new species. On my first visit to Mr. Robbins, in 1924, he persuaded me to collect Cladonias, and for several years I continued to send him material from the District of Columbia and its vicinity and from excursions farther afield. On several occasions I collected with him at Onset, and I recall his pleasure at my chance discovery of a striking new form of *Cladonia cristatella* with orange apothecia, his name for which has not yet been published.

His Cladonia herbarium was, without doubt, the largest private collection of the genus in this country. In addition to a set of Sandstede's Cladoniae Exsiccatae and one of Arnold's Cladoniarum Icones Herbariorum, it contained sets from Dr. Evans collected in New England and the Carolinas; sets of the present writer from Europe, the District of Columbia and vicinity, and the Pacific Coast; a small number of specimens from G. K. Merrill, important because containing fragments of types; a set of A. F. Allen's plants from Quebec; and occasional specimens from others. His own collections, principally from the vicinity of Wareham, Massachusetts, and from Jackson, New Hampshire, where he was accustomed to pass his fall vacations, were very extensive and contained long series of each species selected to show variation. All specimens retained for his herbarium were mounted with glue on small pieces of cardboard, with the data written on the back of the mount and also typed on the front of the envelope. His Cladonia herbarium has been given by his widow to the Farlow Herbarium, with the exception of the sets of Sandstede's Exsiccatae and Arnold's Icones, both of which, already represented there, were acquired by Dr. A. W. Evans for the herbarium of Yale University.

Mr. Robbins' long continued study of Cladonia in Wareham, during which, as he used to remark, he had covered a great part of the area on his hands and knees, made his locality the most carefully investigated region in the United States in respect to its Cladonia flora. His unpublished list of approximately 46 species from Wareham is larger by one than the whole Cladonia flora of Connecticut as reported by Evans. It was his ambition, born of his early struggles with its extremely variable and perplexing species, to produce for the use of other students an up-to-date treatment of the genus for the New England region. Toward this end he prepared keys and descriptions, revising them from time to time as his knowledge increased, but the

[1] A. F. Allen, "Some Cladoniae from the valley of the Cap Chat River and vicinity, Gaspé Peninsula, Quebec," Rhodora **32**: 91–94. *pl. 199.* 1930.

paper never approached final form. He was slow and deliberate in his work, accustomed to go through his extensive series of specimens again and again to test the constancy of supposed characters, and always willing to change his opinion when the facts appeared to require it.

Among the flowering plants, Mr. Robbins devoted particular attention to the asters and goldenrods. His station for *Aster concolor* L. in a field at East Wareham, discovered fifteen years or more ago by Mrs. Robbins, is the only one for this species so far found on the mainland of Massachusetts. *Aster nemoralis* var. *major* Peck (var. *Blakei* Porter), for which he had a station in an open swamp in East Wareham, is less rare but still noteworthy. *Luzula campestris* var. *acadiensis* Fernald, which he collected at Stockton's Point, Wareham, in 1920, has not been found elsewhere south of Maine. None of these records, all represented by specimens in the herbarium of the New England Botanical Club, has been published hitherto. About a year before his death Mr. Robbins became a member of the New England Botanical Club, but, owing to his distance from Boston, he never attended any of its meetings.

In person, Mr. Robbins was of medium height and solidly built, with clean-shaven, ruddy face, blue eyes, and brown hair, which turned to gray in his later years. Sparing of speech, modest, and hospitable, with a quiet sense of humor and a good supply of New England common sense, he was a good companion and a faithful friend.

List of Publications by C. A. Robbins

Botany

Some new Cladonias. Rhodora **26**: 145–148. 1924.

Cladonia mateocyatha, a new species, and some variations in C. Beaumontii. Rhodora **27**: 49–51. 1925.

Cladonia apodocarpa: a new species. Rhodora **27**: 210–211. 1925.

The identity of Cladonia Beaumontii. Rhodora **29**: 133–138. *pl. 157*. 1927.

The identity of Cladonia lepidota Fries. Rhodora **31**: 101–106. *pl. 187*. 1929.

Cladonias collected by S. F. Blake in the western United States. Rhodora **33**: 135–139. *pl. 209*. 1931.

(With S. F. Blake.) Cladonia in the District of Columbia and vicinity. Rhodora **33**: 145–159. *pl. 210–212*. 1931.

Ornithology

Winter birds at Wareham, Mass. Auk **32**: 499–500. 1915.

A colony of Cape Cod piping plover. Auk **36**: 351–355. 1919.

The advantage of crossed mandibles: a note on the American red crossbill. Auk **49**: 159–165. 1932.
Also, with Frank Robbins et al., several Christmas bird censuses from Wareham, Mass. Bird-Lore **17**: 25. 1915; **18**: 21. 1916; **19**: 15. 1917; **20**: 28. 1918; **22**: 17–18. 1920; **23**: 6. 1921.

Bureau of Plant Industry, Washington, D. C.

Some Weeds in an old Garden.—The writer's property in Milton, Massachusetts, comprises about sixteen acres. The greater part of this has been under cultivation for seventy-five years or more. The original layout has been changed but little and many of the trees have been retained where they grew spontaneously.

Since about 1880 I have planted experimentally many species of trees, shrubs and herbaceous plants, and have grown a great many different sorts of vegetables; also many kinds of mulches and fertilizers have been tried. Thus we see why I have been able to note in Rhodora from time to time some interesting weeds. I now wish to speak of a few weeds which have appeared from 1928 to 1932, not forgetting to thank Messrs. Robinson, Fernald, Weatherby, Johnston and Blake for help in identification.

1. Solanum nigrum L., var. villosum L.; with the type, amongst vegetables, 28 September 1928.

2. Echium plantagineum L.; in a flower border, a single plant, 7 August 1929.

3. Sisymbrium Sophia L.; 29 May 1929 and 14 June 1931, each time a single plant. (Also I have a specimen from C. E. Perkins' collection, "Boston 1882.")

4. Artemisia annua L.; lone weed, flower bed, 25 September 1929.

5. Tagetes minuta L.; vegetable garden, 5 October 1929. Dr. S. F. Blake writes (with my specimens in hand) "*****with very little doubt *T. minuta* L. ***** the heads are too young to make this identification absolutely certain ***** already reported from North Carolina."

6. Sisymbrium orientale L., amongst vegetables, 7 July 1931.

7. Verbesina encelioides (Cav.) B. & H., var. exauriculata Robinson & Greenman. A single plant in a mixed border, 19 July 1932.

8. Eclipta alba (L.) Hassk., lone weed in my strawberry bed, 2 October 1932.

I have put specimens of all in the Gray or The New England Botanical Club Herbaria excepting only *Sisymbrium Sophia* L. of which material was very limited.—Nathaniel T. Kidder, Milton, Massachusetts.

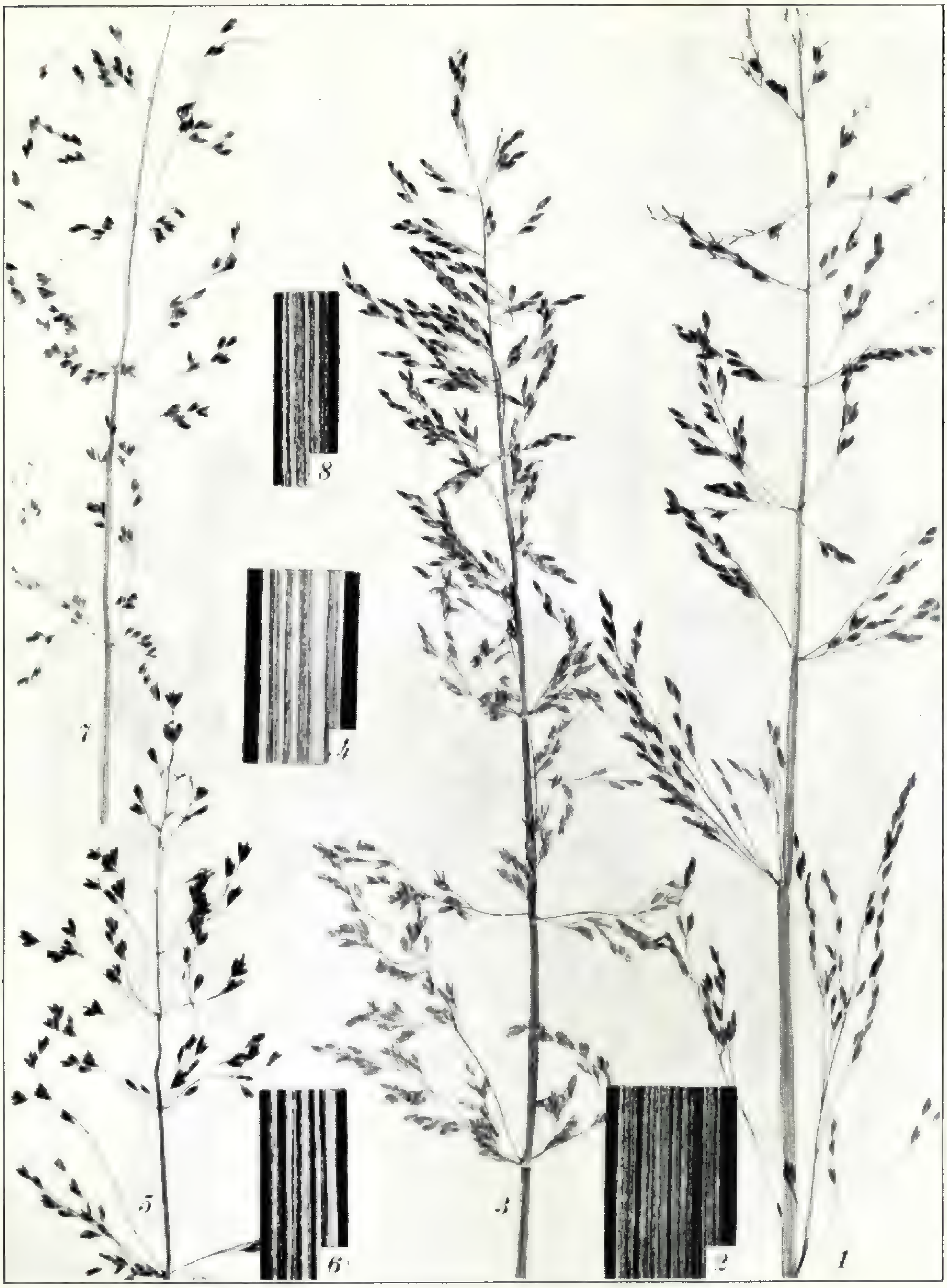
Moss Flora.[1]—Part 3, Vol. III, of Grout's Moss Flora was issued in November. It describes 143 species and varieties, approximately half of which are fully illustrated by excellent line figures reproduced from such standard authorities as Bruch and Schimper, Husnot, Sullivant, Jennings, Dixon, etc., while many are from original drawings by Mrs. Cleaves. Illustrations of those not figured in this part will almost invariably be found in Grout's "Mosses with a Hand-lens and Microscope," to which, in each case, there is a definite reference. Additional authentic illustrations are also cited. The contrasting characters in the keys are, so far as checked, clear and definite; e. g., "large" and "small" are supplemented by definite minimum and maximum measurements. The text and plates are of the same high grade as in earlier parts, and only a very few minor typographical errors have been noted. The genera described are indicated below. The figure following each name indicates the number of species and varieties described under that genus. *Rhytidium* (1), *Rhytidiopsis* (1), *Rhytidiadelphus* (4), *Hylocomium* (5), *Hypnum* (31), *Brotherella* (4), *Heterophyllum* (2), *Sematophyllum* (6), *Homomallium* (3), *Amblystegiella* (4), *Pylaisia* (7), *Platygyrium* (4), *Taxithelium* (1), *Mittenothamnium* (1), *Tripterocladium* (1), *Vesicularia* (4), *Ectropothecium* (1), *Stereophyllum* (2), *Plagiothecium* (31), *Entodon* (11), *Holmgrenia* (5), *Thuidium* (14).—J. F. C.

Hawaiian Weeds.[2]—A bulletin on the Weeds of the Hawaiian Islands, the senior author of which was, for many years, an active member of the New England Botanical Club, will interest some readers of Rhodora. Besides a page of descriptive text each species has a full-page illustration in line-drawing. Naturally, most of the plants are unfamiliar in New England, but *Chenopodium carinitum*, native of Australia, reached Cape Cod before it did Hawaii. And several of our familiar New England weeds are there: *Setaria verticillata*, *Digitaria sanguinalis*, *Amaranthus hybridus*, *Malva rotundifolia*, etc.—M. L. F.

[1] *Moss Flora of North America, North of Mexico*, by A. J. Grout, Ph.D. pp. 115–178, pls. 30–44. Published by the Author, Newfane, Vt. Nov. 1932.

[2] *Weeds of the Pineapple Fields of the Hawaiian Islands*, by Harold St. John and Edward Yataro Hosaka Univ. Hawaii. Research Pub. no. 6, 196 pp. (including illustrations.). Paper-bound, $.75; cloth, $1.75. Publications Office, University of Hawaii, Honolulu, Hawaii.

Volume 35, no. 411, including pages 69–110, 1 portrait and 1 plate, was issued 4 March, 1933.



CATABROSA AQUATICA: FIG. 1, panicle, × 1; FIG. 2, summit of culm, × 6.
C. AQUATICA, var. LAURENTIANA: FIG. 3, panicle, × 1; FIG. 4, summit of culm, × 6.
C. AQUATICA, var. UNIFLORA: FIGS. 5 (European) and 7 (American), panicles, × 1; FIGS. 6 (European) and 8 (American), summits of culms, × 6.

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB

Conducted and published for the Club, by

MERRITT LYNDON FERNALD, Editor-in-Chief

JAMES FRANKLIN COLLINS
CHARLES ALFRED WEATHERBY } Associate Editors
LUDLOW GRISCOM

Vol. 35. May, 1933. No. 413.

CONTENTS:

Notes from the Woods Hole Laboratory,—1932.
I. F. Lewis and W. R. Taylor 147

Distribution of Iris versicolor in Relation to the post-glacial Great Lakes. *Edgar Anderson* 154

Recent Discoveries in the Newfoundland Flora (continued).
M. L. Fernald 161

Callitriche anceps in New England. *M. L. Fernald* 185

Epidemic among Zostera Colonies. *W. R. Taylor* 186

The New England Botanical Club, Inc.
8 and 10 West King St., Lancaster, Pa.
Room 1001, 53 State St., Boston, Mass.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price, $2.00 per year, net, postpaid, in funds payable at par in United States currency in Boston; single copies (if available) 20 cents. Volumes 1–8 or some single numbers from them can be supplied only at advanced prices which will be furnished on application. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be considered for publication to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than two pages of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

M. L. FERNALD, 14 Hawthorn Street, Cambridge, Mass.

Subscriptions (making *all remittances* payable to RHODORA) to Ludlow Griscom, 8 W. King St., Lancaster, Pa., or Museum of Comparative Zoology, Cambridge, Mass.

Entered at Lancaster, Pa. Post Office as Second Class Mail Matter.

INTELLIGENCER PRINTING COMPANY

Specialists in Scientific and Technical Publications

EIGHT WEST KING ST., LANCASTER, PA.

CARD-INDEX OF NEW GENERA, SPECIES AND VARIETIES OF AMERICAN PLANTS, 1885 TO DATE.

For American taxonomists and all students of American plants the most important supplement to the Index Kewensis, this catalogue in several ways exceeds the latter work in detail, since it lists not only the flowering plants, but ferns and other vascular cryptogams, and includes not merely genera and species, but likewise subspecies, varieties and forms. A work of reference invaluable for larger herbaria, leading libraries, academies of sciences, and other centers of botanical activity. Issued quarterly, at $22.50 per 1000 cards.

GRAY HERBARIUM of Harvard University,
Cambridge, Mass., U. S. A.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. DAY. Leatherette. Pocket size. Invaluable for collector's memoranda and herbarium records. Published and sold by the GRAY HERBARIUM, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

MEMOIRS OF THE GRAY HERBARIUM. A series of illustrated quarto papers issued at irregular intervals, sold separately.

No. III. The Linear-leaved North American Species of Potamogeton, Section Axillares, by M. L. Fernald. 183 pp., 40 plates, 31 maps. 1932. $3.00.

Gray Herbarium of Harvard University, Cambridge, Mass.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3/4 in. 1 year $4.00, 6 months $2.50.

Sphacelaria plumigera: fig. 4, habit, × 7.1; fig. 1, tip of axis, × 18.5.
Tilopteris Mertensii: fig. 3, habit, × 3.2; fig. 2, ultimate ramuli with monosporangia, × 16.5.

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 35. May, 1933. No. 413.

NOTES FROM THE WOODS HOLE LABORATORY,—1932[1]

I. F. Lewis and W. R. Taylor

(Plate 274.)

The David Starr Jordan Algae from Penikese Island.—A small package of specimens of marine algae was found at Stanford University, annotated as being from Penikese Id. and collected by Dr. Jordan, presumably during the time he spent there at the Agassiz laboratory (Alexander School of Natural History). Through the kindness of Prof. G. M. Smith they were sent to the writers at the Marine Biological Laboratory for study and deposit. When seen by Prof. B. M. Davis, he recognized the specimens as some which he had found among Jordan's materials after the Penikese visit, and had annotated as to collector and station. In view of the prominence attained by the collector, and the fact that they probably represent the evidence underlying part of his earliest scientific work, they acquire a special significance. Like almost all algal collections of the period (*ca.* 1873) the specimens are very small, but in nearly every case remain in determinable condition. While the writers' verdict as to species represented does not always coincide with the name inscribed on the mount, few alterations in the published list are suggested thereby.[2]

The specimens number over 40 groups, though a considerably lower number of species. It would be idle to record here changes in specific

[1] Printed with aid of a grant to Rhodora from the National Academy of Sciences. Plate 274 is numbered out of sequence in the volume owing to the long series of consecutive plates in the continued paper upon Newfoundland.

[2] Jordan, D. S. The flora of Penikese. American Nat 8: 193–197. Apr. 1874.

assignment or in synonymy which do not affect the published lists.[1] Apart from such, some items seem to call for special mention. The following were found present in the collection, although unreported or erroneously named, by Jordan. On sheets originally labeled *Gelidium corneum* though corrected in pencil, appeared *Lomentaria uncinata* Menegh. There is a record of *G. corneum* in the 1874 list, but it is not authentically reported from the district. Originally labeled *Griffithsia corallina* and in pencil *G. Bornetiana* was material properly designated *G. globulifera* Harv. The specimens originally labeled *Polysiphonia nigrescens* were sorted into that species, *P. urceolata* (Dillw.) Grev. and *P. atrorubescens* Grev. Of the original collection *P. affinis* and sundry other mislabeled specimens seem to be *P. violacea* Grev., which name has but recently been brought into question.[2] This does not appear to be an appropriate place to assume the nomenclatorial changes involved, so the familiar practice is retained. A mixture, primarily *Antithamnion cruciatum* (C. Ag.) Naeg., with *Callithamnion roseum* (Roth) Harv. and *C. corymbosum* C. Ag., was originally labeled *Antithamnion americanum*. The specimens of *Chondriopsis tenuissima* were the slender plant often called *Chondria Baileyana* (Mont.) Harv. The specimen of *Phyllophora Brodaei* is more correctly *P. membranifolia* (G. & W.) J. Ag. The specimens of *Ceramium diaphanum* were all *C. fastigiatum* (Harv.) Ag., although the former is certainly to be expected on the island; *C. arachnoideum* proves to be simply a small *C. rubrum* (Huds.) C. Ag. Only *Lomentaria uncinata, Polysiphonia atrorubescens* and *Callithamnion roseum* are additions to the recorded flora, as they appear neither in the 1874 or 1924 lists.

It is not possible absolutely to exclude names from the list on the basis of changes in assignment of the specimens received, because this collection is far from complete, and a considerable number of Jordan's names, including some doubtful ones, are unrepresented by specimens. However, the presumption against the presence of *Gelidium corneum* and *Griffithsia corallina* is strengthened; the other names confirmed as incorrectly used are of plants already known to be found at Penikese, or which may reasonably be expected. There remains a residue of species reported by Jordan which are to be

[1] Lewis, I. F. (Edit.). The flora of Penikese, fifty years after. Rhodora **26**: 181–195, 211–219, 221–229. Oct., Nov., Dec., 1924.

[2] Tandy, G. Notes on phycological nomenclature, I. Jour. of Bot. **69**: 225–227. 1931.

expected, but were not found among his specimens nor in the 1924 collections. Of eight mentioned in the 1924 paper as the most notable among these, three have recently (1931) been collected: *Enteromorpha clathrata* (Roth) Grev. (L. M. Perry), *Cladophora gracilis* (Griff.) Kg. (C. Moore) and *Callithamnion Baileyi* Harv. (B. Andrew).

If time could be given to thorough collecting on the island more effective completion of the list might be expected, but as the visits are always made in the interests of groups of as yet inexperienced students, the "finds" are more by accident than design. Material of *Trailliella intricata* Batters (H. T. Croasdale) and *Asparagopsis hamifera* (Hariot) Okam. have also been secured, probably recently introduced in the course of their spread in the Buzzards Bay district. As early as 1925[1] there was secured on Penikese an alga, at first indeterminate, later described as *Acrothrix novae-angliae* Taylor, which during 1926–1927 became more abundant, and which has persisted as an occasional element of the flora of the district. Since this note attempts to assemble records supplementary to the 1874 and 1924 lists, four other species should be mentioned. In the herbarium of one of the writers (W. R. T.) there appears a specimen of *Scinaia furcellata* (Turn.) Bivona purporting to have been collected on Penikese Id. 31 July 1890 by S. Burrage, received in a distribution from W. A. Setchell. In the general catalog of the algae of the Woods Hole area B. M. Davis[2] lists a few algae from Penikese stations, including *Dictyosiphon hippuroides* (Lyngb.) Aresch., *Agardhiella tenera* (J. Ag.) Schmitz, and *Polyides rotundus* (Gmel.) Grev., which seem otherwise unrecorded. *Myriotrichia clavaeformis* Harvey (W. R. Taylor) was found in abundance upon Scytosiphon at Penikese 8 July 1930.

Penikese Lichens of the 1924 Survey.—A few lichens were collected by the mycological squad during this survey, but no account of them was available at the time report was made. Ultimately a list of determinations made by the late Prof. Bruce Fink was kindly transmitted by Dr. C. W. Dodge. The 20 collection numbers cover 10 species, all still represented by one number in the Fink lichen herbarium at the University of Michigan, the complete series being at the Farlow Herbarium, Harvard University.

[1] Taylor, W. R. A species of Acrothrix on the New England coast. American Jour. Bot. 15: 577–583. 1928.

[2] Davis, B. M. General characteristics of the algal vegetation of Buzzard's Bay and Vineyard Sound in the vicinity of Woods Hole. Bull. (U. S.) Bur. Fisheries 31 (1): 443–544, (2): 795–833. 1913.

Cladonia coniocraea (Floerke) Spreng. On soil.
Cladonia fuscata (Huds.) Spreng. On soil.
Cladonia symphycarpa (Ach.) E. Fries. On moss over soil.
Lecanora allophana (Ach.) Nyl. On bark.
Lecanora Hageni Ach. On granite.
Parmelia caperata (L.) Ach. On trees.
Parmelia sulcata Tayl. On trees.
Ramalina calicaris (L.) E. Fries. On branches.
Physcia stellaris (L.) Nyl. On bark.
Xanthoria parietina (L.) T. Fries. On trees.

Changes in the Woods Hole Algal Vegetation.—The interval since the preparation of the last series of Notes[1] has seen curious shifts in the incidence of certain notable elements of the flora. The behavior of *Trailliella intricata* is especially remarkable. First coming to our attention in 1927, it increased in abundance and largely replaced *Spermothamnion Turneri* (Mert.) Aresch. in its favored habitats, and consequently as a dominant element in the algae drifted ashore over large stretches of the coast at certain periods. The writer believes that he noted a marked reduction in the abundance of Trailliella in 1931, extended in 1932, and the future of the genus will be watched with great interest. If it parallels that of *Acrothrix novae-angliae* it may continue to decrease until the plant is rare. The later species, first detected 1925, became frequent at certain station in 1928, but by 1931 was again a rarity, though still found as occasional specimens and in 1932 became abundant cast upon the Ganset Tract beach during a brief period. Trailliella, presumably an introduction, reached a really prominent position in the flora, while Acrothrix, described as native, did not do so. The history of *Dumontia filiformis* (Fl. Dan.) Grev. and *Asparagopsis hamifera* (Hariot) Okamura is still one of increase, the former being a substantial floral element on certain shores in early summer, while the latter is no longer an extreme rarity and the plants found are far larger and better developed than those originally reported and figured,[1] although extremely tangled types of growth are also found. It was abundant at Penikese Id. in 1932. The curious large Myxophycean introduction, *Brachytrichia Quoyi* (Ag.) Born. & Flah., continues to be sporadic. Abundant at Scraggy Neck in 1920, after several years of unsuccessful search it appeared again in abundance in the late summer of 1930 (H. T. Croasdale) at one of its old stations (Hadley

[1] I. F. Lewis and W. R. Taylor. Notes from the Woods Hole Laboratory—1928. Rhodora **30**: 193–198. 1928.

Harbor, Naushon Id.), repeating in very small quantity in 1931. No changes in the longer-known flora have been as marked as in these just mentioned, although *Lomentaria rosea* (Harv.) Thuret, after several years of great rarity, has become frequent (1930–1931–1932) on wharves at Woods Hole and Menemsha Bight, as well as dredged about the Devil's Bridge. *Fucus platycarpus* Thuret, from holding an obscure place has become an abundant and constant feature upon the rocks, usually nearer the high tide line than *F. vesiculosus* L.—W. R. T.

New Records of Marine Algae.—Two very extraordinary records were established during a dredging trip taken to the neighborhood of Devil's Bridge, off Gay Head, Marthas Vineyard, Massachusetts, on the 8th of July, 1931. The first of these concerns *Tilopteris Mertensii* (Sm.) Kg. (Plate 274, fig. 2, 3). One larger piece 6 cm. in length, and few smaller pieces were secured. The material was in good condition, abundantly branched and with very numerous and characteristic monosporangia. This appears to be a new record of this plant and of the family (Tilopteridaceae) to which it belongs, since no record of any representative of the family in America is known to the writer. The plants grew in relatively shallow water, accompanied by *Hildenbrandia Prototypus* Nardo, *Sphacelaria plumigera* Holmes, Schizonema colonies of diatoms, and other algae. The stones were dredged abundantly and discarded in the field, excepting a few pieces kept for the Hildenbrandia or other obvious algae. The presence of the two novelties was not noted until close examination took place in the laboratory, and probably much more material was thrown away.

The second novelty is determined as *Sphacelaria plumigera* Holmes, (Plate 274, fig. 1, 4) with some caution in view of the sterile state of the specimens. Associated with Tilopteris, several small pieces were detatched from a few stones remaining from large hauls chiefly discarded in the field. The branching and general features of the plant lead one to expect to place it among *S. plumigera*, *S. plumosa* or small *Chaetopteris plumosa*. The second is eliminated as a possible name, since in that species the cortical cells are not transversely subdivided, as was the case in our material. The choice between the other two was hard to make, in the sterile state and considering the possibility of its representing juvenile Chaetopteris. The decision rests mainly on structural features developed in Sauvageau's monograph.[1] It

[1] Sauvageau, C. Remarques sur les Sphacelariacées. Jour. de Bot. **14**, **15**, **16**, **17**, **18**. 1900–1904. Continued as separate publication, completed 1914.

appears that in fertile condition separation is easy, since sporangia occur on the primary ramuli in the Sphacelaria, and only on ramuli from the rhizoidal outer cortex (somewhat as in Cladostephus) in Chaetopteris. Lacking fruit, an effective vegetative character appears in the manner of origin of the rhizoids which form the cortex. In *S. plumigera* (Sauvageau v. **15**, p. 111–116, fig. 22d) all the rhizoids are formed in the plane of the distichous ramuli, and while they later envelope the axis, at first its upper and lower faces are naked. In *C. plumosa* (Sauvageau v. **15**, p. 144–149) they appear indiscriminately all about the axis from the beginning, and seem also to form a heavier and firmer cortex. Again, in examining the margins of the basal disk-like hapteral portions of these species one finds that *S. plumigera* has cells from one-half as long as wide to equal in this respect (Sauvageau v. **15**, fig. 22a), while in Chaetopteris these marginal cells are longer than broad, to twice as long (Sauvageau v. **15**, fig. 24a). In both of these distinctive features, as in more intangible matters of aspect, the Devil's Bridge plants clearly resemble *S. plumigera*, and this is apparently a first record of the plant for America.

In addition to the description in Sauvageau's paper, the writer was able to confirm his opinion by comparison with the specimen of *S. plumigera* in his copy of Traill's list of Firth of Forth algae[1] and Kattegat material collected by Børgesen, with a few European specimens of *C. plumosa*, and American material of a plant once referred near *S. plumosa* (*S. californica* Sauv.). At a late stage in this study the writer received from Prof. H. P. Bell material brought to him from Prince Edward Island by Miss Constance MacFarlane, and correctly determined as *C. plumosa*. The piece seen by the writer was very small, but in rhizoid character conformed to Chaetopteris, and the cortex bore some old sporangia in the correct position for that genus. Chaetopteris has been recorded[2] from the American northwest coast, from Prince Edward Island and northward, and from Greenland as well as northern Europe.—W. R. T.

Disappearance of Zostera in 1932.—It was evident to many biological observers along the coast of New England that in 1932 *Zostera marina* L. was strikingly reduced from its normal abundance.

[1] Traill, Geo. W. A monograph of the algae of the Firth of Forth, illustrated with herbarium specimens of some of the rarer species. Publ. for Author, pp. 16 + 1, 8 spec. Edinburgh, 1885.

[2] Farlow, W. G. The marine algae of New England. Rept. U. S. Comm. Fish & Fisheries of **1879**. Appendix A-1: 1–210. 1881.

Usually forming vast meadows in many areas, and present in some quantity nearly everywhere that suitable conditions of bottom offered, one was tempted to consider it quite absent from many of its most productive habitats. A report from Nova Scotia indicates that a similar situation has prevailed through the Maritime Provinces, the plant usually almost eliminated, with occasional areas showing a sparse growth and small areas without obvious loss. On the Maine coast about Lamoine known meadows were bare. Chatham Bay on Cape Cod, the whole Falmouth and Woods Hole district, well known meadows about West Falmouth and Sconticut Neck in Buzzards Bay; also the Elizabeth Islands to Cuttyhunk and Penikese Islands, areas on Marthas Vineyard, in many cases verified by personal observation of the writer, were nearly or quite depopulated. Practically no living *Zostera* was brought ashore by the wash; even heavy surf from an early September gale, which would have loosened much in Buzzards Bay, had there been any significant growth, cast up only occasional fragments. From the Cold Spring Harbor area information comes that at several stations, and on both sides of Long Island (N. Y.) similar conditions prevailed. While a report suggests that about Wildwood, N. J., little change in the *Zostera* growth was to be noted there, observations in Chesapeake Bay and on the nearby coast are emphatic that the *Zostera*, which is normally very abundant, was very seriously reduced, being (from June and onward) represented by scattered blades in areas usually densely covered, and with no marked reappearance during the season. Finally, as the southernmost source of information, a report from Beaufort, N. C. indicates distinct scarcity there, which in some spots was partially overcome late in the summer.

These are necessarily fragmentary observations (at least as summarized here)[1] of so great a coast line, but they point to a phenomenal disturbance in the whole marine sublittoral biological situation, because in the absence of this plant a notable list of animals are unable to find their preferred, or even their only suitable, attachment place, spawning ground, or food. Reports from zoölogists are quite striking in this respect. The industrial use of *Zostera* for insulation and packing materials, and as a dressing for fields in agriculture, is also intermitted. No reasoned suggestions as to the cause of the disturbance

[1] Information from A. G. Huntsman, H. P. Bell, D. B. Young, W. S. Schmitt, H. T. Croasdale, S. I. Kornbauser, H. G. Richards, R. V. Truitt, H. F. Prytherch, and others, is gratefully acknowledged.

are offered here. It appears that the plant reappeared (very scantily, indeed) in some of the denuded areas during the summer, and that the rhizomes were sometimes still present under the mud in the old meadows, intact, and perhaps viable. It is certain that in no considerable area did the plant, remaining dormant during early summer, reappear to full luxuriance by September.—W. R. T.

Explanation of Plate 274

Fig. 1. Sphacelaria plumigera, tip of axis showing distichous ramuli, × 18.5; fig. 2. Tilopteris Mertensii, portion of small branch showing ultimate ramuli with monosporangia, × 16.5; fig. 3. Tilopteris Mertensii, portion of main axis showing habit, × 3.2; fig. 4. Sphacelaria plumigera, portion of plant showing habit, × 7.1.

THE DISTRIBUTION OF IRIS VERSICOLOR IN RELATION TO THE POST-GLACIAL GREAT LAKES[1].

Edgar Anderson

In connection with a study of geographical differentiation in two species of Iris (Anderson 1928), an attempt has been made to work out their distribution in as great detail as possible. While the survey is not yet completed, it gives promise of contributing useful evidence as to vegetational changes in glacial and post-glacial times.

Iris versicolor is a northern species, its distribution being roughly that of the northern coniferous forest. *Iris virginica* is a southern species which spreads up from the Gulf and the southern coastal plain to Virginia, Ohio, southern Michigan, and central Minnesota. At the western limits of their ranges, where the transition between northern coniferous forest and deciduous forest is a sharp one, the range of *Iris versicolor* coincides exactly with that of the white pine (*Pinus Strobus*). Figure 1. is compiled from my own collections and from records very kindly sent me by Prof. F. K. Butters of the University of Minnesota and by Prof. N. C. Fassett of the University of Wisconsin. It shows the western distribution of *Iris versicolor* in relation to that of the northern forest. Eastward, in Michigan, Ontario and Ohio, where the boundaries of the northern forest become less clearly defined, the ranges of *Iris versicolor* and *Pinus Strobus* show greater deviation though they are still essentially the same.

[1] Contribution from the Univ. of Mich. Biological Station. Published with aid of a grant to Rhodora from the National Academy of Sciences.

A very similar situation has been reported by Butters (1927) in his careful study of the varieties of *Maianthemum canadense.* He finds that in Minnesota the two varieties of Maianthemum are so sharply separated that they might be considered as good species were it not for the fact that they have become hopelessly intermingled along the Atlantic seaboard.

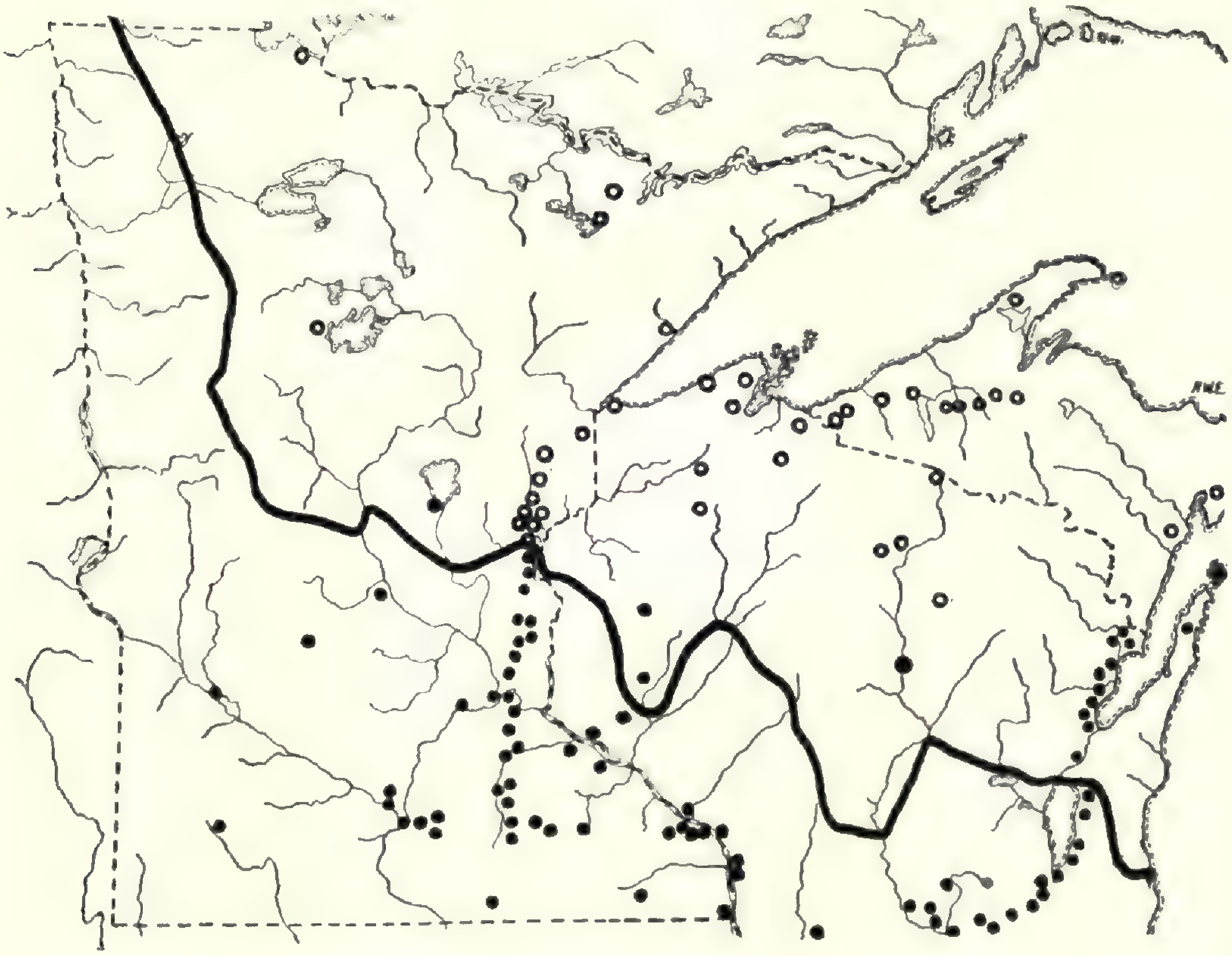


Fig. 1. Distribution of Iris versicolor (open dots) and Iris virginica (solid black) in Minnesota and Wisconsin. The irregular black line marks the approximate southern limit of the coniferous forest.

Although *Iris versicolor* and *Iris virginica* occupy very different ranges, they are found, one in the north and the other in the south, in almost exactly the same situations. They occur along the borderlines of swamps in the transition zone where it is too dry for *Typha* and too wet for grasses. So characteristically are they found in such situations that Gates in his studies of plant associations in Northern Michigan (1926) has named this transition zone the "Iris association."

In the rare cases where their ranges overlap, both species are found

growing side by side in the same wet pasture or along the same interdunal swamp. *Iris versicolor,* to be sure, shows its northern heritage in that it flowers earlier and ripens its fruits more quickly than does *I. virginica.* In those parts of Michigan where the two species grow together their blooming periods barely overlap. If there is any apparent difference between the requirements of the two species it is that *I. versicolor* is more tolerant of occasional drying out and can continue to flower and fruit in situations where *I. virginica* will only persist vegetatively.

In Michigan the habitats of the two species are particularly similar. Both in the northern and southern parts of the state there are numerous "tamarack swamps" filling poorly drained hollows left by the last glaciation. They seem to be fundamentally the same plant-association in all parts of the state, yet in the northeastern third of the peninsula, *Iris versicolor* is found about the swamp margins while in the south and west *I. virginica,* and never *I. versicolor,* is found in the same relative position.

Why should we find *Iris virginica* all the way from the gulf northwards, in cypress swamps, willow thickets, floodplain lakes, wet prairies, and sphagnum bogs, only to have it completely replaced by another and very similar species in the northern coniferous forest? Must it not be that the main reasons for the present distributions of the two species are historical rather than edaphic; that we find one in the northern Michigan swamps and the other in southern Michigan swamps, not because there is any great difference between the two situations but because one species has come in from the north in company with a whole northern flora and that the other has spread in from the south? It furthermore seems quite possible that neither species has moved about a great deal locally since it first entered the region. The one natural mode of travel of each species is by water. Their seeds and rootstocks float readily and are often found establishing themselves on marshy spots along lake and river beaches. There seems little possibility of spread by other means. The seeds are too large and heavy to be blown about. The rootstocks are acrid and poisonous and would seldom be carried by animals.

For the above reasons it was thought that the present distribution of the two species might quite accurately reflect ancient vegetational changes. A careful study of their exact distribution in northern Michigan was made in July 1931. Previous work had shown (Ander-

son 1928) that *Iris virginica* is found south of a curved line running from Tawas City, Michigan to Traverse City, Michigan, and that *Iris versicolor* occurs from there northwards. The 1931 field work confirmed this distribution with one surprising exception. As is shown in FIGURE 2 there is a large irregular area at the very tip of the peninsula where *Iris virginica* is found almost exclusively.

This anomalous distribution of *Iris virginica* is related in no apparent way to soil conditions or climatic factors. Douglas Lake and Munro Lake, for instance, are only one mile apart. Yet swampy land along the former is colonized by *Iris virginica* while in exactly the same relative locations on the edges of Lake Munro, *Iris versicolor* is common and prolonged search failed to reveal a single plant of the other species. Most of the situations in which *Iris virginica* is found in this area are ancient beaches of the glacial and post-glacial Great Lakes. Since both *Iris versicolor* and *I. virginica* are found coming up today along marshy beaches of the modern Great Lakes, it seemed possible that there might be some correlation between the distribution of the two species and the shore lines of these ancient lakes.

FIGURE 2 shows how very logical their distribution becomes on that assumption. Lake Algonquin, the last of the glacial lakes, persisted some time in the region and cut strongly marked beaches by which its extent can be accurately determined (Leverett and Taylor). These beaches show that in Algonquin time, northern Michigan was an archipelago of islands as is shown in FIGURE 2. Today those parts of the region which were then above the waters of Lake Algonquin are populated with *I. versicolor*. Throughout this whole area only one small plant of *Iris virginica* has been found above the Algonquin beaches and it was growing in a roadside ditch. *Iris versicolor*, on the other hand, occurs in profusion around Lake Munro and Lark Lake and in smaller quantitites at several other points.

Below the Algonquin Beach line the situation is reversed. *Iris virginica* is found by the hundreds of thousands of plants and *Iris versicolor* is found only immediately below the Algonquin beaches, in situations where it might easily have been washed down from above, or as an occasional plant here and there along the roadside. The water level fell from the Algonquin to the Nippissing stage by a series of intermediate steps, leaving many abandoned interdunal swamps. In these swamps *Iris virginica* is found in enormous numbers. Around French Lake it occurs by the acre; in all the swamps

around Douglas Lake it is common and in some of them is accociated with other southern plants such as Silver Maple (*Acer saccharinum*).

Near the edge of the Jack Pine Plains, a few miles south of the town of Indian River (on Burt Lake) is a wet meadow so similar to such formations in the south that one can find no better term to use in describing it than savannah. This interesting locality was discovered

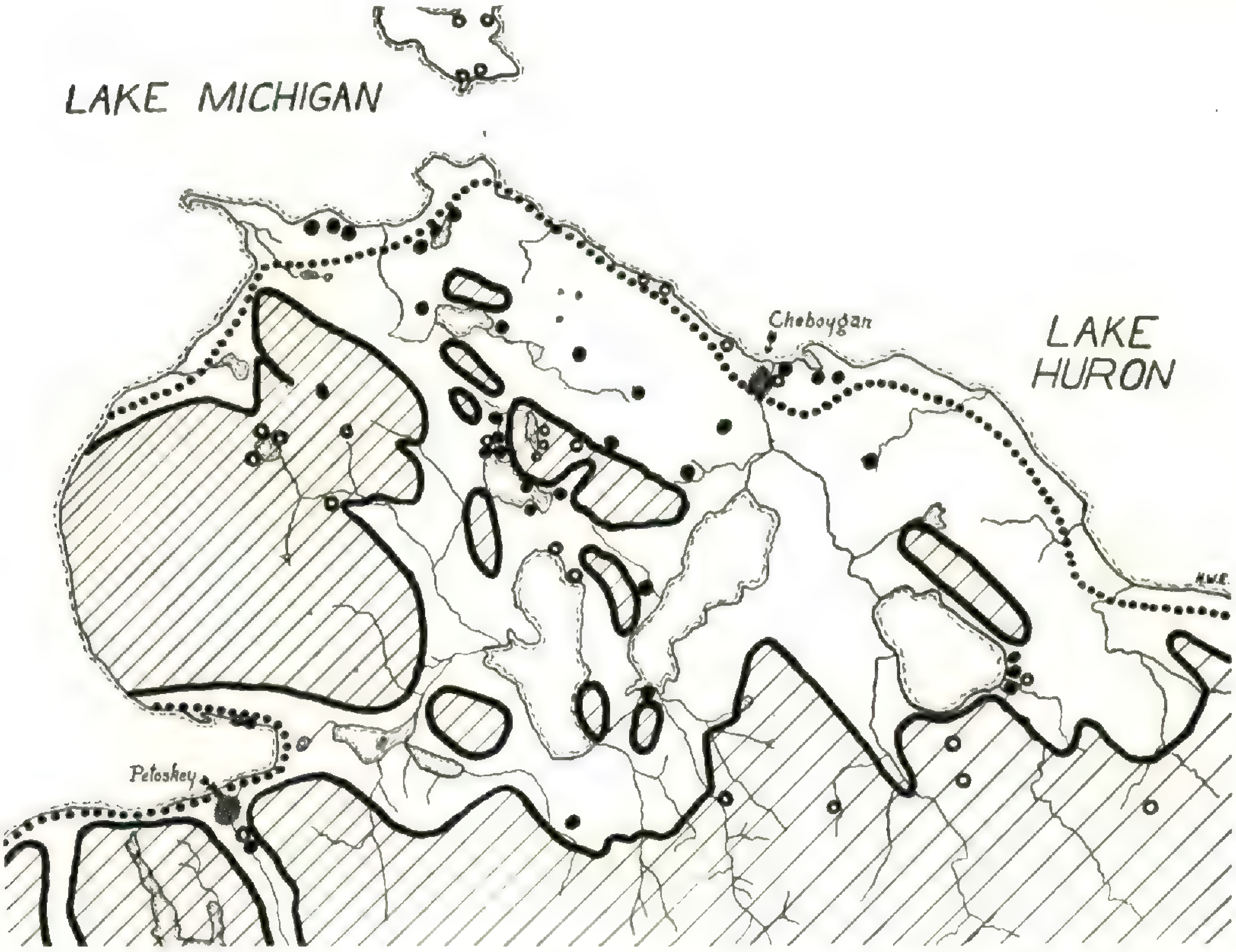


Fig. 2. Distribution of Iris versicolor (open dots) and Iris virginica (solid black) in the Douglas Lake region. The heavy black line represents the Algonquin beaches and the cross-hatched areas were above the waters of Lake Algonquin. The chain of dots represents the beaches of Lake Nippissing.

by Dr. J. H. Ehlers who has reported (1921) on the surprising occurrence there of the distinctively coastal plain species, *Panicum virgatum* L. var. *cubense* Griesb. Along the small stream which drains the area *Iris virginica* grows rampantly, its flowers borne nearly shoulder high. As one stands in the midst of the little savannah, surrounded by *Iris virginica* and *Panicum virgatum* var. *cubense*, and with the Jack Pine too far in the background to reveal their specific identity . . . it is hard not to believe that one is in the

Carolinas instead of at the edge of the Jack Pine Barrens of northern Michigan.

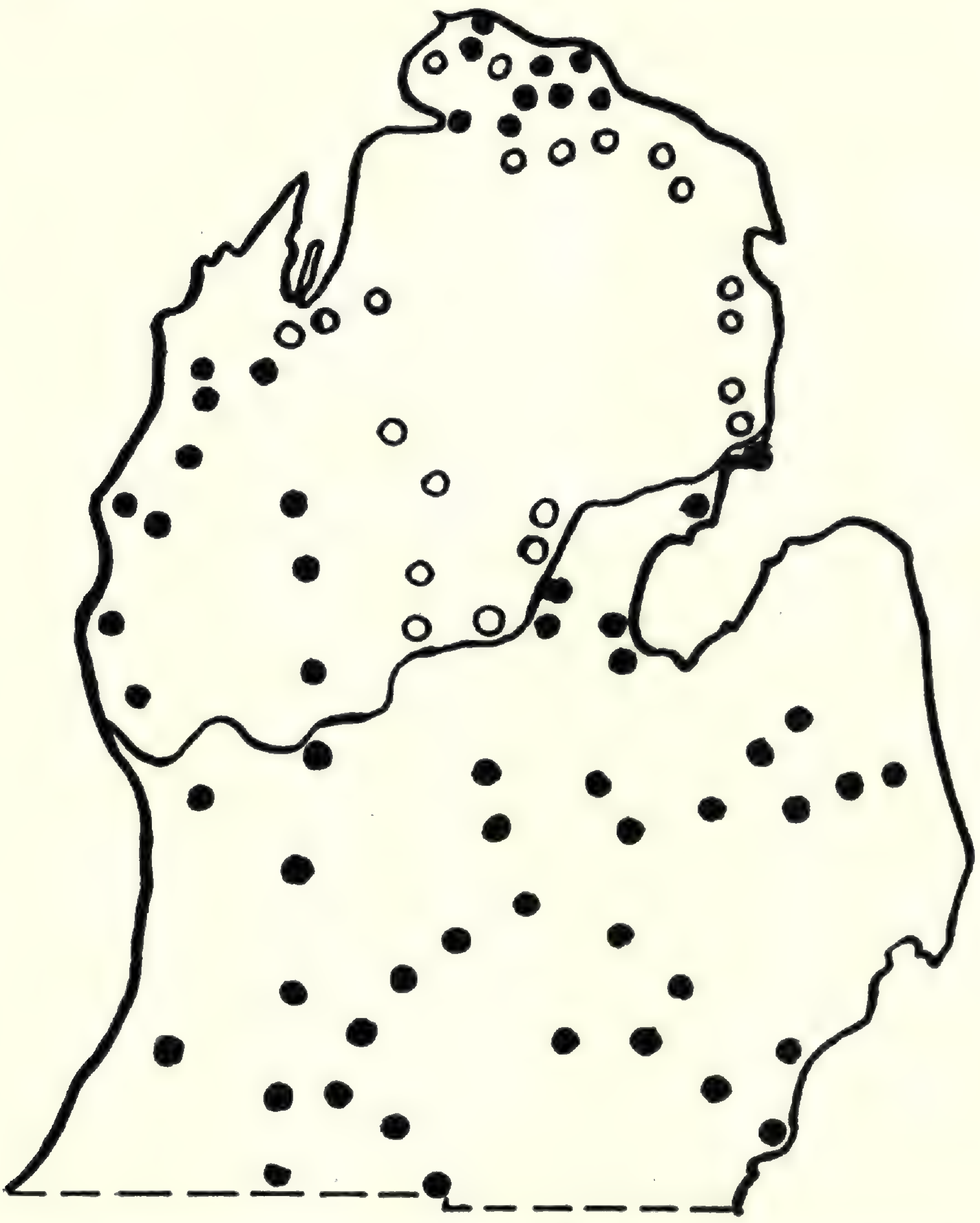


Fig. 3. Distribution of IRIS VERSICOLOR and IRIS VIRGINICA in the southern peninsula of Michigan. The wavy black line represents the approximate southern extent of the northern types of forest.

From the Nippissing level the Great Lakes fell to approximately their present level. Along the interdunal swamps of the intermediate levels both species are found, though *Iris versicolor* is apparently the more common.

Since *I. versicolor* is prevailingly a northern and *I. virginica* a characteristically southern species one might suppose that during warm eras *Iris virginica* would be brought to the lake beaches while during colder periods *Iris versicolor* would predominate. On these assumptions the present distribution of the two species would indicate; I. That in Algonquin time the mainland and the archipelago were clothed with a northern vegetation. II. That the waters fell from the Algonquin level during a time when the climate was much warmer, perhaps even warmer than it is at present, as evidenced by the almost complete absence of the northern species of Iris from the beach swamps of that period.

If these conclusions are confirmed by the pollen analysis studies of Michigan bogs already under way (Sears, 1930), the distribution of *Iris virginica* and *Iris versicolor* may prove useful in studies of glacial and post-glacial vegetation. The southern limit of *Iris versicolor* in Michigan (FIGURE 3) seems, for instance, to be correlated with the interlobate morraine of the last glaciation. Does this perhaps mean that *I. versicolor* persisted in the tundra vegetation of the interlobate region during the end of glacial times and that in the warm period following the retreat of the ice the regions previously covered by the Saginaw and Lake Michigan lobes were colonized by southern species?

In addition to the regions mentioned above, the two species meet in southern Ontario, north-eastern Ohio, to a certain extent at least along the Great Lakes-St. Lawrence system in New York, and on the Atlantic Coast. I shall be glad to assist anyone who may be interested in following up the minutae of their distribution in these regions.

Anderson, Edgar 1928. The problem of species in the northern Blue Flags, *Iris versicolor* L. and *Iris virginica* L., Annals Mo. Bot. Gard. **15:** 241–332.

Butters, F. K. 1927. Taxonomic studies in the genus *Maianthemum*. Minn. Studies in Plant Science **6:** 429–444.

Ehlers, J. H. 1921. Rhodora **23:** 200.

Gates, Frank C. 1926. Plant successions about Douglas Lake Michigan. Bot. Gaz. **82:** 170–182.

Leverett, Frank and Taylor, Frank B. 1915. The Pleistocene of Indiana and Michigan and the history of the Great Lakes. U. S. Geolog. Survey. Monograph No. 53.

Schantz, H. L. and Zon, Raphael. 1924. Natural vegetation. Atlas of Am. Agric. Part 1 Sec. E.

Sears, Paul B. 1932. Post-glacial climate in eastern North America. Ecology **13:** 1–6.

Linder, D. H. 1922. Some varieties of *Panicum virgatum*. Rhodora **24:** 11–16.

Arnold Arboretum.

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. Fernald

(*Continued from page 140*)

Agropyron § Goularda in Eastern North America.—With four recent monographic studies of North American *Agropyron* one would suppose it possible to place our few plants of this group with relative satisfaction. In 1897 there appeared Scribner & Smith's extensive *Native and Introduced Species of the Genera Hordeum and Agropyron;*[1] in 1905 Piper's brief but critical *Agropyron tenerum and its Allies;*[2] in 1910 Pease & Moore's *Agropyron caninum and its North American Allies;*[3] and in 1932 Malte's *The so-called Agropyron Caninum (L.) Beauv. of North America.*[4] All four papers are the result of close study and careful consideration but if we accept the conclusions of one of the revisions we find ourselves at odds with the others. The genus is notoriously difficult and individual judgments as to specific and varietal lines are bound to differ; consequently, no one treatment can now be worked out which will be wholly satisfactory to all students. In the area best known to me, the region from southern Labrador and Newfoundland to New England and the Great Lakes, the genus has its great development in eastern North America; and assiduous collecting (nearly 300 numbers) of it and close study of its complexities, both in the field and in the herbarium, during a period of forty-five years have given me a bowing acquaintance with the group which makes it difficult to follow, without some divergence, any of the four revisions above noted.

The greatest discrepancies are found in the treatments of § *Goularda*, the nonstoloniferous group of which *Agropyron caninum* (L.) Beauv. is typical. As Malte clearly shows[5] (pp. 28–30), true *A. caninum* of Eurasia is quite a different species from the long-awned plant of North America which has erroneously passed for it. Abundant herbarium material supports this decision, so that the primary premises of Pease & Moore's revision, that our plant is *A. caninum* and that such very different plants as *A. latiglume* (Scribn. & Sm.)

[1] Scribner & Smith, U. S. Dept. Agric. Div. Agrost. Bull. no. 4: 23–36 (1897).

[2] Piper, Bull. Torr. Bot. Cl. xxxii. 543–547 (1905).

[3] Pease & Moore, Rhodora, xii. 61–77 (1910).

[4] Malte, Nat. Mus. Can. Ann. Rep. for 1930, 27–48, plates 1–5 (1932).

[5] Earlier students, Beal and others, had doubted the occurrence of *A. caninum* in America; and in 1900 Scribner (in Brainerd, Jones & Eggleston, Fl. Vt. 9) implied that we do not have it.

Rydb. and *A. tenerum* Vasey are merely variations of it, lose much of their force. The North American counterpart of the Eurasian *A. caninum*, the plant (PLATE 244, FIGS. 1–4, and MAP 18) with long awns, occurring generally from Newfoundland and eastern Canada to New England and Pennsylvania, thence across the continent, is *Triticum subsecundum* Link (1833), the type of which is illustrated by Malte (his plate v), while its very large extreme (our PLATE 244, FIGS. 5–7 and MAP 19), with glumes, lemmas and often the awns longer, is *A. Richardsoni* Schrad. (1838) or *A. unilaterale* Cassidy (1890), not *A. unilaterale* Beauv. (1812). Scribner & Smith, Hitchcock (in Gray's Manual) and Rydberg all maintain the two latter (*A.* "*caninum*" and *A. Richardsoni*) as distinct species; Pease & Moore as different varieties; and Malte treats them as strictly identical!

Agropyron Richardsoni and the so-called *A. caninum* of North America sometimes overlap in their characters, but the former has a distinctive disruption of geographic range which suggests that it is not merely a selected series of overgrown individuals. Whereas *A.* "*caninum*" (MAP 18) is a common or frequent plant of either calcareous or non-calcareous ledgy and gravelly shores and dry woods and thickets from eastern Newfoundland to Pennsylvania, thence westward to the Pacific, the coarse *A. Richardsoni* (MAP 19) is decidedly localized east of the Great Lakes: confined to the St. Lawrence system eastward to Gaspé and Anticosti, chiefly in calcareous soils. Therefore, *A. Richardsoni*, with a distinctive geographic range and in its typical development with clearly recognizable morphological characters, is, it seems to me, at least a good geographic variety.

Malte, agreeing in principle with Pease & Moore, treats *Agropyron tenerum* Vasey (PLATE 243, FIGS. 1–3), including both *A. pseudorepens* Scribn. & Sm. (PLATE 243, FIGS. 4–6) and *A. novae-angliae* Scribn. (PLATE 243, FIGS. 7–9), and North American *A.* "*caninum*" (PLATE 244, FIGS. 1–4) including *A. Richardsoni* (PLATE 244, FIGS. 5–7) as one polymorphic species; but, having demonstrated that the North American plant is not the Eurasian *A. caninum*, he correctly takes up for the aggregate-species of North America the next available name, *A. trachycaulum* (Link) Malte (1932), based on *Triticum trachycaulum* Link, apparently overlooking the fact, however, that the same combination under *Agropyron* was made by Steudel in 1854 and was repeated by Candargy in 1901.

The type of *Agropyron trachycaulum*, illustrated by Malte, is exactly *A. tenerum* Vasey (1885), but, again agreeing with Pease & Moore,

Malte merges with it two plants, *A. pseudorepens* Scribn. & Sm. and *A. novae-angliae* Scribn., which in eastern America are much more widely dispersed than typical *A. trachycaulum*. True *A. trachycaulum* or *A. tenerum* (PLATE 243, FIGS. 1–3 and MAP 15) (also *Triticum pauciflorum* Schwein. (1824)) has very slender and elongate spikes, with the tightly appressed spikelets scarcely imbricated, the tips of most of them failing to reach the spikelet next above (on the same side); many of the internodes of the rachis strongly quadrate, with all four sides deeply concaved, the middle internodes mostly 0.8–2 cm. long; glumes coriaceous or subcoriaceous, with hyaline border 0.4–0.6 mm. broad and the closely embraced rachillas (PLATE 243, FIG. 3) usually only scabrous or appressed-pubescent. This plant, true *A. trachycaulum* or *A. tenerum*, is widely dispersed in western North America, from southern Alaska to California, thence eastward to the more western of the Great Lakes; east of Minnesota and adjacent Ontario and Wisconsin it is represented in the extensive eastern collections in the Gray Herbarium only from limestone cliffs, slopes and gravels near the Gulf of St. Lawrence in eastern Quebec: Anticosti and the Mingan Islands, the Gaspé Peninsula and Bic.

The other plants merged, without any indication of doubt by Pease & Moore (except that they separated the shorter-spiked specimens of *A. pseudorepens* as *A. caninum*, var. *Hornemanni*) and, again, by Malte, with true *A. trachycaulum* (*A. tenerum*) usually have dense spikes of well-imbricated and less closely appressed spikelets; the internodes of the rachis usually not strongly quadrate but with convex or corrugated backs and commonly 2 (instead of 4) ciliate edges; the middle internodes short; the glumes inclined to be more herbaceous and narrowly margined (hyaline margins only 0.1–0.4 mm. broad); the free rachillas commonly villous (with loosely spreading pubescence). These plants with denser spikes appear in two well marked geographic trends. The first of these (PLATE 243, FIGS. 4–6 and MAP 16) is prevailingly calcicolous, occurring very generally from southern Labrador and the lower St. Lawrence to southern Maine on limy soils or on the margins of the sea or in brackish or saline marshes. Inland it is more inclined to take to the upland, occurring (as *A. caninum*, var. *Hornemanni* Pease & Moore) in the subalpine and alpine (not always calcareous) regions of Maine and New Hampshire. It next appears on the north shore of Lake Superior and extends thence across the calcareous plains westward, where it is known as

A. pseudorepens. This plant has comparatively dense spikes, in maturity (in fruit) averaging 7 mm. in diameter, in anthesis much thicker, and with glumes averaging 12.5 mm. long. As stated, the shorter-spiked members of this series were called by Pease & Moore *A. caninum*, var. *Hornemanni* and many botanists have identified them with *A. violaceum* (Hornem.) Lange, based upon *Triticum violaceum* Hornem. Malte clearly shows, however, that the name *Triticum violaceum* was a *nomen confusum* which should be rejected, while *T. biflorum*, *β. Hornemanni* Koch, involved in the typification of *A. caninum*, var. *Hornemanni*, was, by description, *A. latiglume* (Scribn. & Sm.) Rydb., an arctic species with unkeeled and broad-margined broadly oblong to narrowly obovate glumes and pubescent lemmas, which is unknown in eastern North America south of northern Labrador.

The other dense-spiked plant with villous rachillas, merged by Pease & Moore and now by Malte with typical *Agropyron trachycaulum* (*A. tenerum*), is *A. novae-angliae* (PLATE 243, FIGS. 7–9 and MAP 17), characterized by its slender spike (in maturity averaging only 5 (3–6) mm. in diameter), with the glumes averaging 8 (5–10) mm. long and the lemmas proportionally small. *A. novae-angliae* passes into *A. pseudorepens*, which in turn merges into *A. trachycaulum*, but in its typical form *A. novae-angliae* in the East is a plant of low altitudes and usually on neutral to acid soils (either rock, gravel or wet peat) from northern Labrador to the granitic hills of southern New England, thence westward. In general, then, while typical *A. trachycaulum* in eastern America is confined to the limestones bordering the Gulf of St. Lawrence in Quebec, *A. pseudorepens*, also chiefly calcicolous, has a wider eastern range, from southern Labrador to southern Maine and northern New Hampshire; and *A. novae-angliae*, chiefly of neutral or acid soils, extends into the cooler parts of southern New England.

Although very different in their extremes, all these plants seem to pass, as Pease & Moore and, later, Malte have independently maintained, into one another.[1] In their best developments, however, they all have rather distinct geographic ranges, at least in eastern America; and I find myself looking upon them as reasonably defined geographic

[1] The late Charles Walter Swan, an unassuming but wonderfully close student of New England grasses, left many suggestive notes on specimens he studied. On one of *A. trachycaulum*, var. *glaucum* ("*A. caninum*"), collected at Willoughby in 1898, he wrote: "Cut off the awns and compare. Why, 'violaceum' [*i. e. novae-angliae*]."

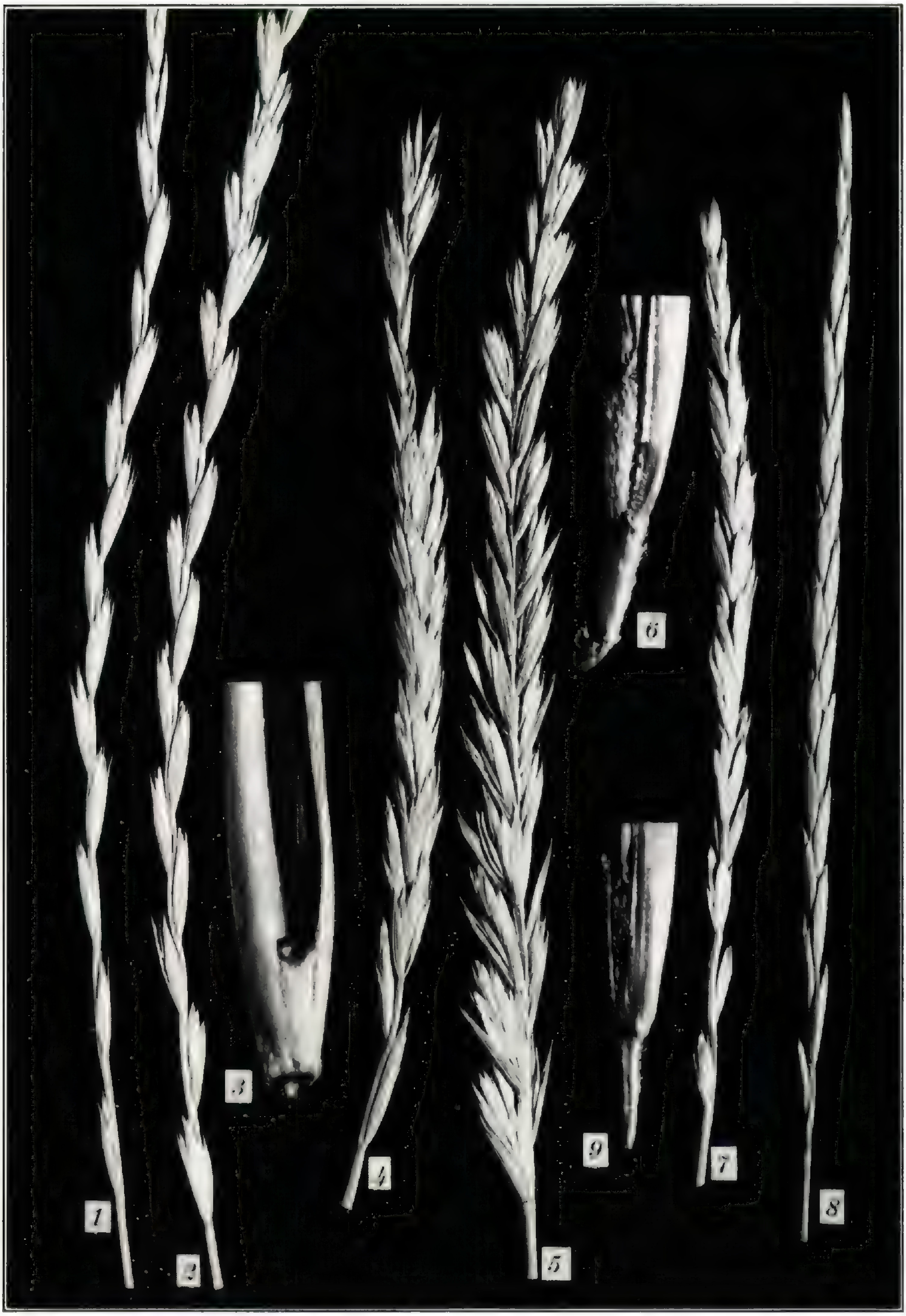
varieties. It does not seem satisfactory to submerge as identical with *A. trachycaulum* (*A. tenerum*) such pronounced variations as *A. pseudorepens* and *A. novae-angliae;* nor does it seem any more satisfactory to treat as strictly identical *A. Richardsoni* (*A. unilaterale*) and the smaller "*A. caninum.*"

All or nearly all of our varieties of *Agropyron trachycaulum* may have green or more or less glaucous or glabrous or more or less pubescent phases. These usually occur without appreciable geographic segregation (often in closely adjacent colonies), and long experience in the field has abundantly demonstrated that such variations may be expected throughout the ranges of any of the major or primary varieties. Pease & Moore, following what seems the more logical method in such cases, treated them as *formae*, this being the procedure which for several years the more progressive systematists have been adopting. Thus, the late Otto Holmberg, whose regrettable death has left unfinished the most scholarly of Scandinavian floras, treated such minor tendencies as forms, reserving the varietal category for stronger variations, with notable differences in size of parts or with morphological differences and somewhat definite ranges: *Festuca ovina*, f. *hispidula* and f. *laeviflora*, but var. *vivipara* and var. *duriuscula; F. rubra*, f. *glaucescens* and f. *planifolia*, but var. *commutata* and var. *oelandica; Agropyron repens*, f. *pubescens*, but var. *maritimum;* etc. In general, I have for some years been trying to follow this procedure and so have Blake, Eames, Weatherby and others in America. Malte, discussing such variations, concludes that "all variations of the same nature ought to be considered as equals, i. e. ought to be conceded equal taxonomic rank and value." As pure logic, wholly dissociated from the actual vagaries of Nature, this may be conceded; but, surely, when applied in classification, the logic often fails; characters which in one group are of great taxonomic importance in another may prove wholly unimportant and to be a series of nonconcomitant and unresolvable variables.

In the present case I find myself unable to follow my friend, Malte, in treating selected plants with "at least" a trace of pubescence on the old shrivelled basal sheaths, persisting from last year's new vegetative shoot, as true varieties on a par with variations so strong that they are often considered good species: such phases of the long-awned plants as his *Agropyron trachycaulum*, vars. *ciliatum* and *glaucum* or of the awnless plants as his vars. *trichocoleum* and *Fernaldii.* Nor can I

treat as coordinate with the true geographic varieties (which Scribner & Smith, Piper, Hitchcock and Rydberg have treated as full species) the more or less glaucous individuals (Malte's *A. trachycaulum*, vars. *glaucescens*, *Fernaldii*, *caerulescens* and *glaucum*), minor tendencies which differ from the green individuals only in having more wax on the surface. By drying these over heat or by immersing them in hot water *A. trachycaulum*, var. *glaucescens* becomes the green plant (*A. violaceum*, var. *majus* Vasey); var. *Fernaldii* becomes the green var. *trichocoleum* and vars. *caerulescens* and *glaucum* promptly become their greener counterparts.

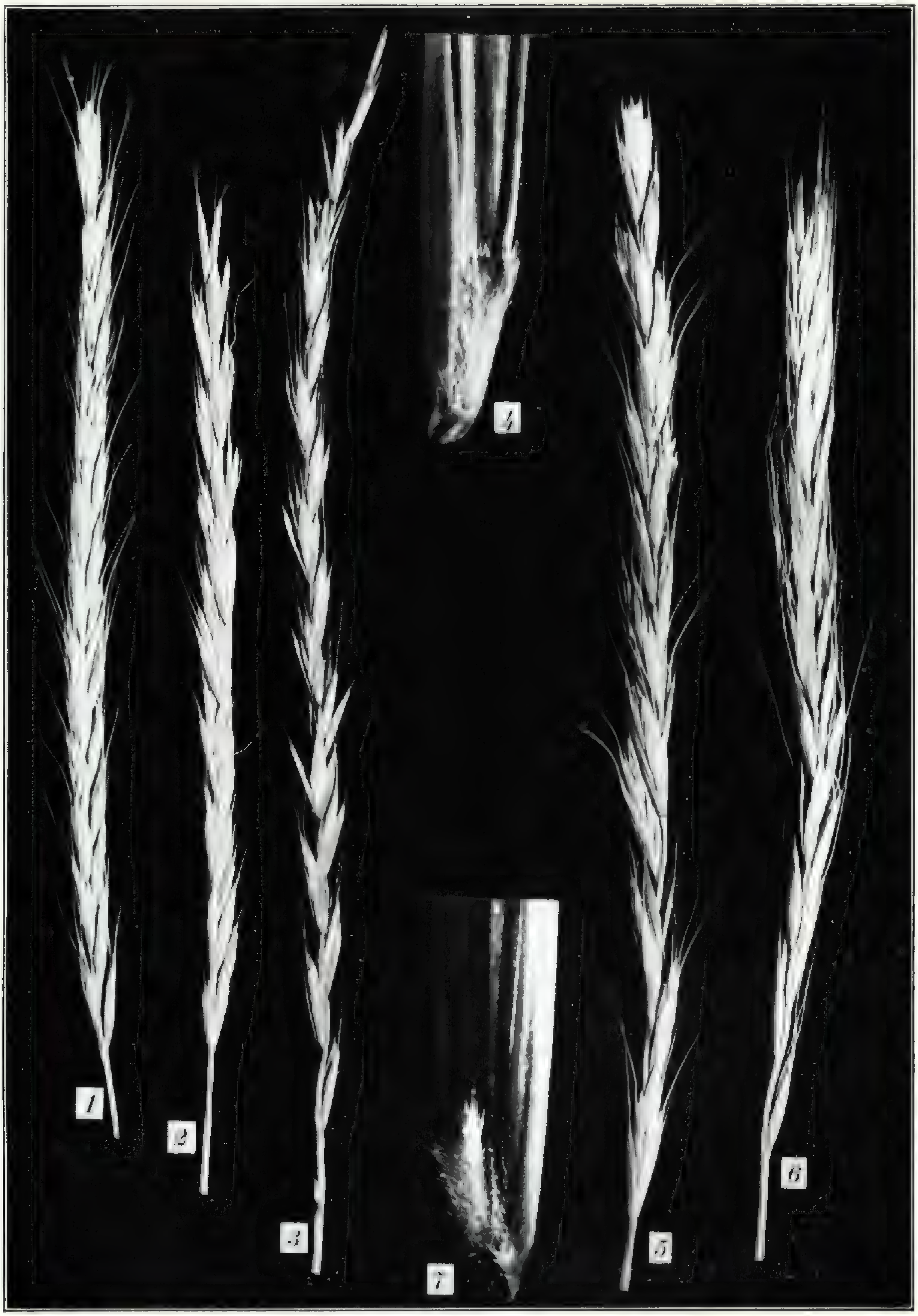
As a matter of fact, furthermore, authentic specimens of two of these so-called "varieties" from the same locality are so nearly indistinguishable that only by the closest examination can one detect that they may possibly have been collected from different clumps. *Agropyron trachycaulum*, var. *Fernaldii* (Pease & Moore) Malte, based on *A. caninum*, var. *tenerum*, f. *Fernaldii* Pease & Moore, is a slightly glaucous phase with "At least the lowest sheaths pubescent." Its designated type was collected by *John Macoun*, no. 68,978, at Cap à L'Aigle on "August 8," 1905 (in Gray Herb.) and as identical with it Pease & Moore cited another collection in the Gray Herbarium from Cap à l'Aigle, "*J. Macoun* . . . no. 68979," with the date (on the label) also "Aug. 8th, 1905." Unfortunately, Pease & Moore made a slight but confusing error, for Macoun's no. 68,978 (their type) has the date on the label (in Macoun's hand) "Aug. 24th," instead of "August 8," as cited by them. The two sheets look like young material (no. 68,979, labelled "Aug. 8th") and over-ripe material from the same colony (no. 68,978, labelled "Aug. 24th") and the transposition of the date would be of little consequence had not Malte included no. 68,979 as one of the three known collections of his new *A. trachycaulum*, var. *glaucescens* which is distinguished from his var. *Fernaldii* only by having "Sheaths glabrous." The type of var. *Fernaldii* (no. 68,978) has all the cauline leaves and sheaths quite glabrous but, when diligently searched for, two or three of the marcescent old sheaths at the base of the plant, but by no means all, show some pilosity. The younger material (no. 68,979) from the same locality, which Malte puts into a second of his varieties because it has "Sheaths glabrous," shows, likewise, in the material sent by Macoun to the Gray Herbarium, very definite pubescence upon some of the new basal offshoots. The treatment of such trivial individual divergencies (in these cases



Agropyron trachycaulum: fig. 1, inflorescence, × 1, from type collection of *A. tenerum;* fig. 2, inflorescence, × 1, from Quebec; fig. 3, internode of rachilla, closely embraced by lemma, × 10.

Var. majus: fig. 4, mature (closed) inflorescence, × 1, from topotype of *A. pseudorepens;* fig. 5, young inflorescence, × 1, from Newfoundland; fig. 6, internodes of rachilla, × 10.

Var. novae-angliae: fig. 7, young inflorescence, × 1, from type-region, Willoughby, Vermont; fig. 8, ripe inflorescence, × 1, from Massachusetts; fig. 9, internodes of rachilla, × 10.



AGROPYRON TRACHYCAULUM, var. GLAUCUM: FIG. 1, inflorescence, × 1, from the TYPE; FIG. 2, inflorescence, × 1, from TYPE of var. *caerulescens;* FIG. 3, inflorescence, × 1, from TYPE of var. *pilosiglume;* FIG. 4, internode of rachilla and base of lemma, × 10.

Var. UNILATERALE: FIG. 5, inflorescence, × 1, from Anticosti; FIG. 6, inflorescence, × 1, from Montana; FIG. 7, internode of rachilla and base of lemma, × 10.

with lack of apparent divergence) as true varieties does not seem wise, and their recognition as anything but visible but taxonomically unimportant departures from a theoretical type does not seem worth while. At any rate, such slight ecological or physiological responses are not comparable with the varieties which show strong departures in characters of the spikelets, in habitats and in ranges, departures so pronounced that several agrostologists have considered them true species.

In § *Holopyron*, represented in eastern America by species with elongate rootstocks, there is less difference of opinion. All recent authors are agreed as to the distinctness of *Agropyron dasystachyum* (Hook.) Vasey, *A. Smithii* Rydberg, *A. repens* (L.) Beauv. and the American representative of *A. pungens* (Pers.) R. & S (PLATE 245, FIG. 5). In recent years *A. pungens* has been called by some European botanists some kind of hybrid: by Ascherson & Graebner *Triticum junceum* × *repens;* by Rouy *A. junceum* × *littoreum;* by Holmberg *A. litorale* × *repens.* Now, a species (PLATE 245, FIG. 5), thoroughly consistent in all its characters and clearly matching European *A. pungens*, is indigenous at the sea-margin, on shingly beaches, sand dunes and borders of salt marshes, from Cape Breton to Cape Cod, the plant described from the Maine coast as *A. tetrastachys* Scribn. & Sm. It is a thoroughly typical element in the flora of this district, along with *Puccinellia maritima* (Huds.) Parl., *Festuca rubra*, var. *juncea* (Hackel) Richter, *Carex maritima* O. F. Mueller, *Polygonum Raii* Bab., *Suaeda maritima* (L.) Dumort., *Lathyrus japonicus* Willd., vars., and other maritime species which share the European and the American shores of the North Atlantic. Yet neither *Agropyron junceum*, *A. littoreum* nor *A. litorale* is known on the coast of northeastern America. Under the circumstances, with *A. pungens* a constant member of our maritime flora, it seems inevitable that it should be maintained as a true species.

Without overloading the present paper with needlessly detailed descriptions, the leading diagnostic characters of the eastern American species of *Agropyron* of both sections, as I now interpret them, may be briefly summarized in the synoptic key which follows. Since there has been much confusion in the group (especially in § *Goularda*), sufficient specimens in that section (preferably of numbered exsiccatae which will be mostly represented in numerous herbaria) are cited to render my interpretation perhaps intelligible to others. The spikes of

characteristic specimens of the different species and varieties in § *Goularda* are shown, life-size, in PLATES 243 and 244.

For the loan of several types of Vasey and of Scribner & Smith I am indebted to the great kindness of Professor A. S. Hitchcock; for the loan of the type of *Triticum pauciflorum* Schwein. to Dr. Francis W. Pennell; and for material possibly representative of Cassidy's views to Professor Ernest C. Smith.

KEY TO THE SPECIES OF AGROPYRON IN EASTERN NORTH AMERICA

a. Spikelets not strongly flattened, at maturity readily disintegrating, the individual florets promptly disarticulating, leaving the persistent glumes: inner face of fruit flattish or broadly concaved: culms solitary or loosely to densely cespitose, without elongate rootstocks. § GOULARDA (Husnot) Holmb. Skand. Fl. pt. 2: 269 (1926)....*b.*

b. Anthers 1–2.5 mm. long, at most ⅓ as long as the lemmas: lemmas awnless or with essentially straight and ascending awns....*c.*

c. Glumes flat or slightly convex, scarcely keeled, herbaceous or submembranaceous, oblong to narrowly obovate, with hyaline margin 0.5–1 mm. broad: lemmas pubescent: spike 3–13 cm. long: plant arctic or subarctic with us 1. *A. latiglume.*

c. Glumes keeled, subcoriaceous to herbaceous, linear-lanceolate to elliptic, with hyaline margin 0.1–0.6 mm. broad: lemmas glabrous (rarely scabrous): spikes 0.4–2.5 dm. long: plants of temperate regions..............2. *A. trachycaulum.*

b. Anthers 3 mm. long: lemmas with strongly arched-divergent long awns..3. *A. spicatum.*

a. Spikelets strongly flattened or 4-sided, at maturity dropping intact from the rachis, the individual florets not readily detached: anthers at least ½ as long as the lemmas, 3–6 mm. long: inner face of fruit deeply channeled: culms solitary or tufted: rootstocks very elongate and extensively creeping. § HOLOPYRON Holmb. l. c. 273 (1926)....*d.*

d. Lemmas and rachillas densely villous to lanate..4. *A. dasystachyum.*

d. Lemmas and rachillas glabrous to scabrous....*e.*

e. Glumes linear-attenuate, tapering with straight margins from below the middle: spikelets 7–13-flowered: cartilaginous band of upper nodes of culm shorter than thick..................................5. *A. Smithii.*

e. Glumes lanceolate to oblong, gradually curving to tip from above the middle: spikelets 3–7 (in the maritime no. 6, –11)-flowered: cartilaginous band of upper nodes of culm as long as thick.

Spike nearly square in section: internodes of rachis thick, usually 4-angled: spikelets 7–11 (very rarely only 3–5)-flowered: glumes coriaceous, with broadly rounded keel and ribs: leaves hard, very glaucous, mostly involute, with remote coarse ribs: top of culm solid (closely filled with pith)......6. *A. pungens.*

Spike usually not conspicuously quadrate: internodes of rachis thin, rounded on the back, 2-edged: spikelets 2–7-flowered: glumes herbaceous, with slender keel and ribs: leaves soft, flat, with crowded fine nerves: top of culm hollow........7. *A. repens.*

1. A. LATIGLUME (Scribn. & Sm.) Rydberg, Bull. Torr. Bot. Cl. xxxvi. 539 (1909). *A. violaceum latiglume* Scribn. & Sm. U. S. Dept. Agric. Div. Agrost. Bull. no. 4: 30 (1897). *A. biflorum latiglume* (Scribn. & Sm.) Piper, Bull. Torr. Bot. Cl. xxxii. 547 (1905). *A. caninum*, var. *latiglume* (Scribn. & Sm.) Pease & Moore, RHODORA, xii. 73 (1910).—An arctic species, extending south in eastern America only to LABRADOR: Rama, August 20–24, 1897, *Sornborger*, no. 263, as *A. violaceum*.

Agropyron latiglume belongs to an arctic and subarctic series, including the American *A. alaskanum* Scribn. & Merr. and *A. yukonis* Scribn. & Merr. and the Old World *A. mutabile* Drobov. The material from continental boreal America is as yet too scanty to make out the true status of all these reputed species.

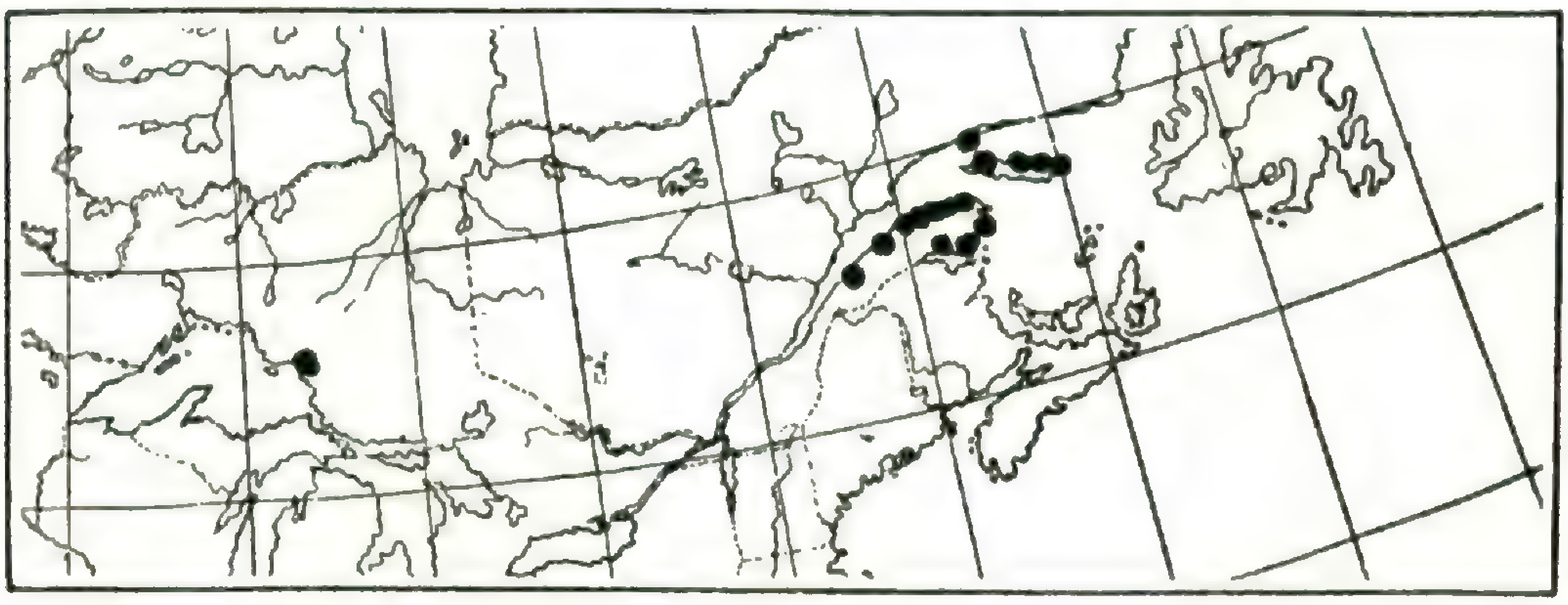
2. A. TRACHYCAULUM (Link) Steud.—A highly variable North American species, represented in eastern America by the following five geographic varieties.

a. Awns wanting or very short, at most ½ as long as body of lemma....*b.*
  b. Glumes coriaceous or subcoriaceous, with hyaline margins 0.4–0.6 mm. broad: spikelets in ours scarcely imbricated, the tips rarely reaching the bases of those above (on the same side): internodes of rachis often strongly quadrate, with all 4 sides concave and winged, mostly 0.8–2 cm. long; the 2nd internode 0.8–1.5 mm. broad, 0.5–1.3 mm. thick: rachilla usually scabrous or strigose, tightly embraced....Var. *typicum*.
  b. Glumes herbaceous to subcoriaceous, the hyaline margin only 0.1–0.4 mm. broad: all or all but the lowest spikelets well imbricated: internodes of rachis shorter, mostly convex or merely corrugated on the back and with 2 narrow edges; the 2nd internode 0.3–0.8 mm. thick: rachilla usually villous, with spreading pubescence, free.
    Glumes (excluding awns, when present) averaging 12.5 (10–16) mm. long: contracted fruiting spike averaging 7 (5–12) mm. thick........Var. *majus*.
    Glumes (excluding awns, when present) averaging 8 (7–10) mm. long: contracted fruiting spike averaging 5 (3–6) mm. thick........Var. *novae-angliae*.
a. Awns nearly equaling to much longer than body of lemma.
    Glumes averaging 9 (6–12) mm. long: awns of lemmas 7–20 mm. long: contracted fruiting spike (excluding awns) averaging 5 (3–10) mm. thick........Var. *glaucum*.
    Glumes averaging 13.5 (12–18) mm. long: awns of lemmas 10–40 mm. long: contracted fruiting spike (excluding awns) averaging 9 (6–13) mm. thick........Var. *unilaterale*.

Var. **typicum**. *Triticum trachycaulum* Link, Hort. Bot. Berol. ii. 189 (1833). *T. pauciflorum* Schwein. in Keating's Narr. Long's 2d Exped. ii. 383 (1824), not *A. pauciflorum* Schur (1859). *A. trachycaulum* (Link) Steud. Syn. Pl. Gram. i. 344 (1854);[1] Candargy, Étude Mon. Tribu Hord. 43 (1901), combination erroneously ascribed to

[1] For date of issue see Rendle, Journ. Bot. xxxvii. 33, 34 (1899).

"Host" (doubtless a misprint for "Hort"); Malte, Ann. Rep. 1930, Nat. Mus. Can. 42 (1932). *Crithopyrum trachycaulum* (Link) Steud. l. c. (1854). *A. tenerum* Vasey, Bot. Gaz. x. 258 (1885). *A. repens*, var. *tenerum* (Vasey) Beal, Grasses N. Am. ii. 637 (1896). *A. tenerum longifolium* Scribn. & Sm. U. S. Dept. Agric. Div. Agrost. Bull. no. 4: 30 (1897). *A. pseudorepens magnum* Scribn. & Sm. l. c. 34 (1897), extremely large spikelets. *A. tenerum magnum* (Scribn. & Sm.) Piper, Bull. Torr. Bot. Cl. xxxii. 546 (1905). *A. caninum*, var. *tenerum* (Vasey) Pease & Moore, Rhodora, xii. 71 (1910). *Zeia tenera* (Vasey) Lunell, Am. Midl. Nat. iv. 227 (1915). *A. trachycaulum*, var. *tenerum* (Vasey) Malte, l. c. 44 (1932). Plate 243, figs. 1–3, and map 15.—Western North America, from southern Alaska to California, eastward to western Ontario, Wisconsin (perhaps introduced), Iowa and Missouri (introduced); limestone soils about the Gulf of St. Lawrence, Quebec. The following selected specimens



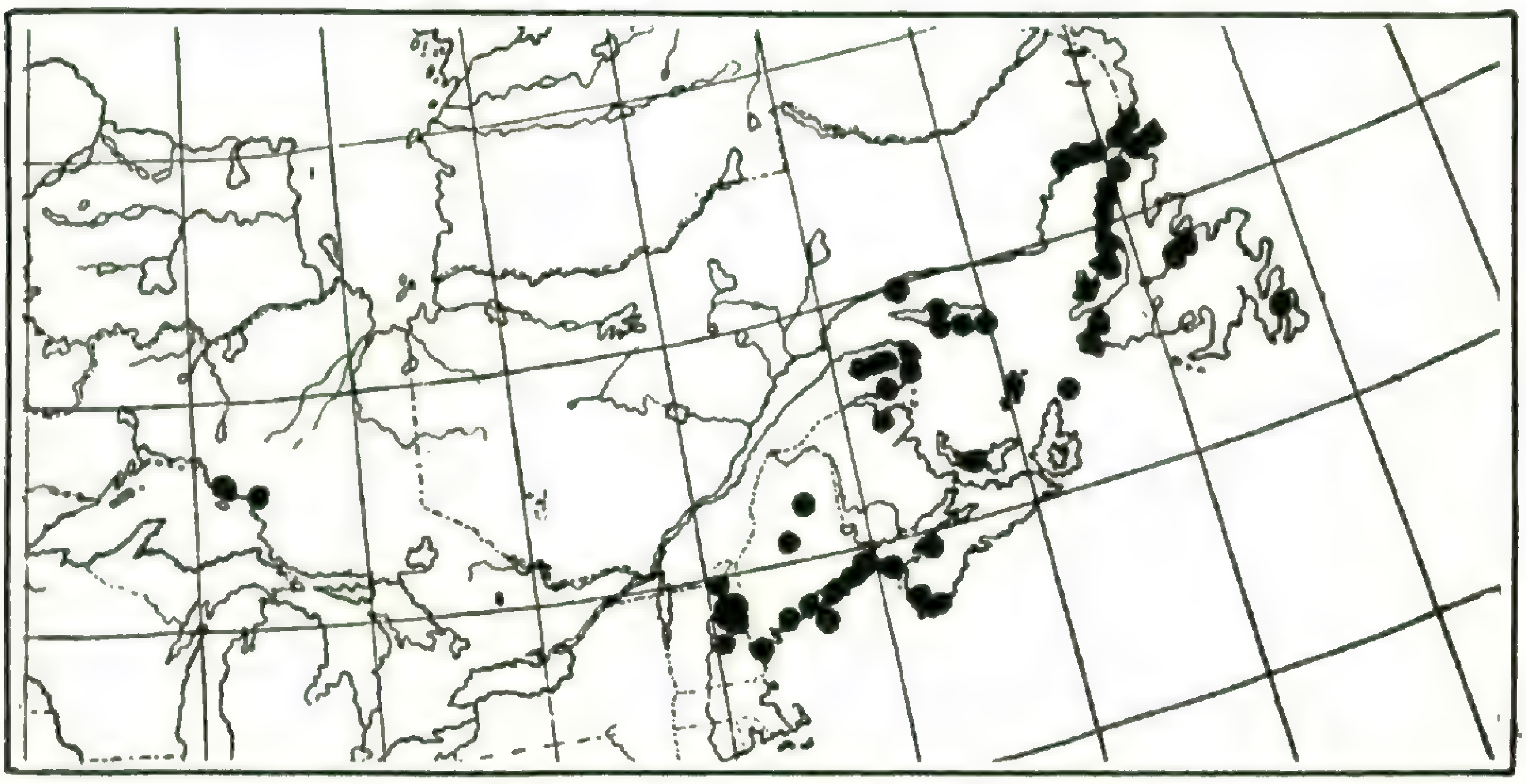
Map 15. Eastern Range of Agropyron trachycaulum, var. typicum.

(chiefly eastern) are typical. Quebec: sur les rivages calcaires, Grande Ile, Archipel de Mingan, *Victorin & Rolland*, no. 20,555; sur les platières calcaires, Riv. au Saumon, Anticosti, *Victorin, Rolland & Louis-Marie*, no. 20,556; sur les alluvions près de l'embouchure de la rivière, Baie du Nord, Anticosti, *Victorin, Rolland & Louis-Marie*, no. 20,588; sur les éboulis dans les gorges, R. Vaureal, Anticosti, *Victorin & Rolland*, no. 27,889; sur les bords de la petite rivière, Pointe de l'Est, Anticosti, *Victorin & Rolland*, no. 27,893; rivages calcaires, R. du Renard, Anticosti, *Victorin & Rolland*, no. 27,894; limestone-conglomerate talus, Mt. Ste. Anne, Percé, *Collins & Fernald*, no. 36; calcareous sea-cliffs between Mont Louis and R. à Pierre, *Fernald & Smith*, no. 25,465; Mt. St. Pierre, *Victorin, Rolland & Jacques*, no. 33,199; dry calcareous slaty talus of Mt. St. Pierre, *Fernald, Weatherby & Stebbins*, no. 2423; cobbly beach of Gulf of St. Lawrence, Cap au Renard, *Fernald & Pease*, no. 24,909; shore of St. Lawrence, Matane, August 3, 1909, *F. F. Forbes;* gravelly beach at Paspébiac Lighthouse, July 26, 1902, *Williams & Fernald;* gravelly beach, Tracadigash Point, Carleton, July 22, 1904, *Collins & Fernald;*

limestone-conglomerate cliffs and ledges, Cap au Massacre, Bic, July 16, 1904, *Collins & Fernald.* ONTARIO: sands at Pic R., July 30, 1869, *J. Macoun*, no. 175. WISCONSIN: Murphy's Railroad track, Green Bay, July 15, 1897, *Schuette.* MANITOBA: Emerson, July 17, 1887, *J. Fowler.* MINNESOTA: Garden Island, Lake of the Woods, *MacMillan & Sheldon*, no. 1353; Fort Snelling, *Mearns*, no. 780; Bridgeman, July, 1892, *Sheldon;* prairies, common, Montevideo, June 19, 1896, *Moyer;* Elmore, *Pammel*, no. 895; "Prairies of the St. Peter" [Minnesota R.], *Say*, 1823 (type of *Triticum pauciflorum* Schwein., in herb. Phil. Acad.). IOWA: Wheatland, *Ball*, no. 271; Ames, June 27, 1893, *F. C. Stewart;* Little Rock, *Ball*, no. 556. MISSOURI: rare, introduced along railroads, Sheffield, July 17, 1898, *Mackenzie*, no. 246, July 10, 1899, *Bush*, no. 142. COLORADO: Fort Garland, 1884, *Vasey* (type no. of *A. tenerum* Vasey, as designated by Piper, Bull. Torr. Bot. Cl. xxxii. 543 (1905))—form with very slender spike; near Empire, *Rydberg*, no. 2401 (type of *A. pseudorepens magnum* Scribn. & Sm., consequently of *A. tenerum magnum* (Scribn. & Sm.) Piper; in U. S. Nat. Herb.)—form with unusually stout spike. OREGON: along spring-runs in open places, near Grant's Pass, *Howell*, no. 256 (type of *A. tenerum longifolium* Scribn. & Sm., in U. S. Nat. Herb.).

Var. **majus** (Vasey), comb. nov. ?*A. violaceum*, β. *virescens* Lange, Consp. Fl. Groenl. 155 (1880). *A. violaceum*, var. *majus* Vasey, Contr. U. S. Nat. Herb. i. 280 (1893). *A. pseudorepens* Scribn. & Sm. U. S. Dept. Agric. Div. Agrost. Bull. no. 4: 34 (1897). *A. tenerum majus* Vasey ex Piper, Bull. Torr. Bot. Cl. xxxii. 543 (1905). *A. caninum*, var. *Hornemanni* Pease & Moore, RHODORA, xii. 73 (1910) in large part, but not as to name-bringing synonym, *Triticum biflorum* β. *Hornemanni* Koch, acc. to Malte, l. c. 38 (1932). *A. tenerum*, var. *pseudorepens* (Scribn. & Sm.) M. E. Jones, Contr. West. Bot. xiv. 19 (1912). *Zeia pseudorepens* (Scribn. & Sm.) Lunell, Am. Midl. Nat. iv. 226 (1915). PLATE 243, FIGS. 4–6, and MAP 16.—Chiefly in calcareous or subalkaline soils, southern Labrador (and ?Greenland) to southern British Columbia, south to coast of Maine, northern New Hampshire, Lake Superior (Ontario) Nebraska, Colorado, Nevada and Oregon. The following, selected from a large representation, are typical. LABRADOR: rocks, Forteau, *Fernald & Wiegand*, no. 2690. NEWFOUNDLAND: edge of salt marsh, Killigrew's, *Fernald & Wiegand*, no. 4691; dry cliffs and talus, Tilt Cove, *Fernald & Wiegand*, no. 4690; ledges, talus and gravel by Exploits R., Bishop Falls, *Fernald & Wiegand*, no. 4687; ledges, etc., Exploits R., Grand Falls, *Fernald & Wiegand*, no. 4686; gravelly and turfy strand near Isthmus Cove, Pistolet Bay, *Wiegand, Gilbert & Hotchkiss*, no. 27,435; turfy limestone barrens, Cape Norman, *Wiegand & Long*, no. 27,438; wet spruce, thicket, Flower Cove, *Fernald, Long & Dunbar*, no. 26,323; limestone ledges and gravel, St. Barbe, *Fernald, Long & Dunbar*, no. 26,324; turfy limestone shore, Plum Point, Brig Bay, *Fernald, Long*

& Dunbar, no. 26,325 (approaching var. *unilaterale*); peaty limestone barrens, St. John Isl., *Fernald et al.*, no. 27,436; turfy and gravelly shore, Back (or Bustard) Cove, *Fernald, Long & Fogg*, no. 1282; turfy terraces and slopes, Pointe Riche, *Fernald, Long & Fogg*, no. 1281; wet runs and boggy spots, Ingornachoix Bay, *Fernald & Wiegand*, no. 2680; damp shores, Port Saunders, *Fernald & Wiegand*, no. 2687; serpentine tablelands, alt. 380 m., Bonne Bay, *Fernald & Wiegand*, no. 2684; inside the strand, Southeast Arm, Bonne Bay, *Fernald & Wiegand*, no. 2693; shelves and talus of diorite, Western Head, Bonne Bay, *Fernald, Long & Fogg*, no. 1283; dry sandy soil near sea-level, Bay of Islands, *Eames & Godfrey*, no. 5878; sea beach, Little River, *Mackenzie & Griscom*, no. 11,178. Quebec: limestone terraces, Blanc Sablon ("Labrador"), *Fernald & Wiegand*, no. 2689; grassy hillside, R. à la Truite, Brest, *St. John*, no. 90,169; sandy isle



Map 16. Eastern Range of Agropyron trachycaulum, var. majus.

in R. St. Augustin, *St. John*, no. 90,168; grassy shore, Pointe au Maurier, Charnay, *St. John*. no. 90,170; grève de cailloutis calcaire, Lac Salé, Anticosti, *Victorin & Rolland*, no. 24,772; cailloutis calcaire, R. la Loutre, Anticosti, *Victorin & Rolland*, no. 24,773 (transition to var. *unilaterale*); sur les platières, R. Chicotte, Anticosti, *Victorin & Rolland*, nos. 27,890, 27,892; platières calcaires, R. MacDonald, Anticosti, *Victorin, Rolland & Louis-Marie*, nos. 20,553, 20,557, 20,559; falaises de la Montagne Saint-Alban, Cap Rosier, *Victorin et al.*, no. 17,834; calcareous walls of Grande Coupe, Percé, *Fernald & Collins*, no. 917, *Victorin et al.*, no. 17,833; calcareous alpine meadow, alt. 1000–1125 m., Table-topped Mt., *Fernald & Collins*, nos. 368, 372; subalpine meadows (alt. 1200 m.), Mt. Au Clair, Tabletop Mts., *Fernald & Smith*, no. 25,467; boggy spots at 1000 m., tableland of Mt. Albert, *Fernald & Collins*, no. 35; crevices and talus of serpentine, Lac au Diable, Mt. Albert, *Fernald & Collins*, no. 411; dans le massif de

serpentine, Ruisseau des Neiges, *Victorin et al.*, no. 17,829; dry schistose crests and talus, alt. 850–1000 m., Mt. Logan, *Pease & Smith*, no. 25,466; alluvial islands at mouth of Bonaventure R., August 4, 1904, *Collins, Fernald & Pease;* gravelly shore of St. Lawrence, Cacouna, August 8, 1902, *Fernald;* vicinity of Cap à l'Aigle, *J. Macoun*, nos. 68,978 (type of *A. caninum*, var. *tenerum*, f. *Fernaldii* Pease & Moore; consequently, of *A. trachycaulum*, var. *Fernaldii* (Pease & Moore) Malte), 68,979 (cited by Malte as var. *glaucescens* Malte); 68,981 (green state). Magdalen Islands: sandstone bluffs, Grosse Isle, *Fernald, Long & St. John*, nos. 6937 (glaucous), 6938 (green). Prince Edward Island: dry clearing, Indian River, *Fernald, Long & St. John*, no. 6943. Nova Scotia: barrens, St. Paul I., *Perry & Roscoe*, no. 77; thicket bordering salt marsh, Villagedale, *Fernald, Long & Linder*, no. 20,104; rocky and gravelly beach (brackish), Eel Lake, *Fernald, Bean & White*, no. 20,101; brackish marsh, Abram R., *Fernald, Bean & White*, no. 20,103; thin open humus (on basalt), North Mt., Belle Isle, *Fernald, Bartram, Long & Fassett*, no. 23,342. New Brunswick: brackish marsh, Bathurst, *S. F. Blake*, no. 5459; shelves of sea-cliffs (basalt), north of Whale Cove, Grand Manan, *Weatherby & Weatherby*, no. 5490. Maine: Mt. Katahdin, August, 1892, *F. P. Briggs;* slide, West Wall, North Basin, Katahdin, July 13, 1900, *Williams, Fernald;* North Wall, North Basin, Katahdin, *S. J. Ewer*, no. 147; opening by Chimney Pond, Katahdin, *Ewer*, no 241; Mt. Kineo, August 26, 1867, *C. E. Smith;* damp basaltic shingle, Lubec, *Fernald*, no. 1365; calcareous ledges, Kelly Point, Pembroke, *Fernald*, no. 1369; edge of salt marsh, Roque Bluffs, August 6, 1919, *Knowlton;* dry sandy shore, Machiasport, July 25, 1914, *Knowlton;* rocky shore, Matinicus, August 6, 1919, *C. A. E. Long;* rocks along shore, Ocean Point, Boothbay, *Fassett*, no. 234; salt marsh, Wells Beach, July 23, 1898, *Fernald.* New Hampshire: railroad track, Northumberland, *Fernald & Pease*, no. 16,715; "in alpinis Montium Alborum," *Tuckerman;* Oakes Gulf, Mt. Washington, *Faxon, Churchill, Kennedy et al.;* Alpine Garden, Mt. Washington, *Faxon, Pease*, no. 10,600; Fan of Huntington's Ravine, *Pease*, no. 13,898; outlet of Lake of the Clouds, Mt. Washington, *Robinson*, no. 979; Ethan's Pond, Mt. Willey, August, 1877, *Faxon;* summit of Mt. Willard, July 19, 1894, *Williams;* border of rich deciduous woods, North Woodstock, *Fernald*, no. 11,566. Vermont: gravelly bank, Canaan, *Pease*, no. 10,088. Ontario: Pic R., Lake Superior, *Loring;* mouth of Dog R., Lake Superior, *J. Macoun*, no. 176. North Dakota: Devil's Lake, July 16, 1902, *Lunell.* South Dakota: Brookings, June 29, 1897, *Thornber.* Nebraska: Kearney, June 20, 1895, *Rydberg*, no. 2018 (type of *A. pseudorepens* Scribn. & Sm.), *Shear*, no. 272 (topotype of *A. pseudorepens*); Merriman, July 11, 1899, *J. M. Bates;* Broken Bow, alt. 2478 ft., *Pammel*, no. 54; Ravenna, *Pammel*, no. 59; wet valley near Whitman, *Rydberg*, no. 1619. Wyoming: Wood's Landing, Albany Co., *Nelson*, no. 3965; Pelican

Creek, Yellowstone Park, *Tweedy*, no. 624. COLORADO: Walsenburg, Huerfano Co., alt. 6000 ft., *Clements*, no. 81; South Park, *E. L. Hughes*, no. 11. NEVADA: Lone Mt., alt. 8000 ft., Elko Co., *P. B. Kennedy*, no. 4357; Truckee meadows, near Sparks, *Kennedy*, no. 3059. OREGON: 1884, *Cusick*, no. 1134 (TYPE of *A. violaceum*, var. *majus* Vasey; consequently of *A. tenerum majus* Vasey; rachilla as in typical *A. trachycaulum*, but plant otherwise like the common eastern form). WASHINGTON: Pullman, *Piper*, no. 1910, in part (mixed with var. *novae-angliae*). BRITISH COLUMBIA: Cascade, *J. M. Macoun*, no. 63,388.

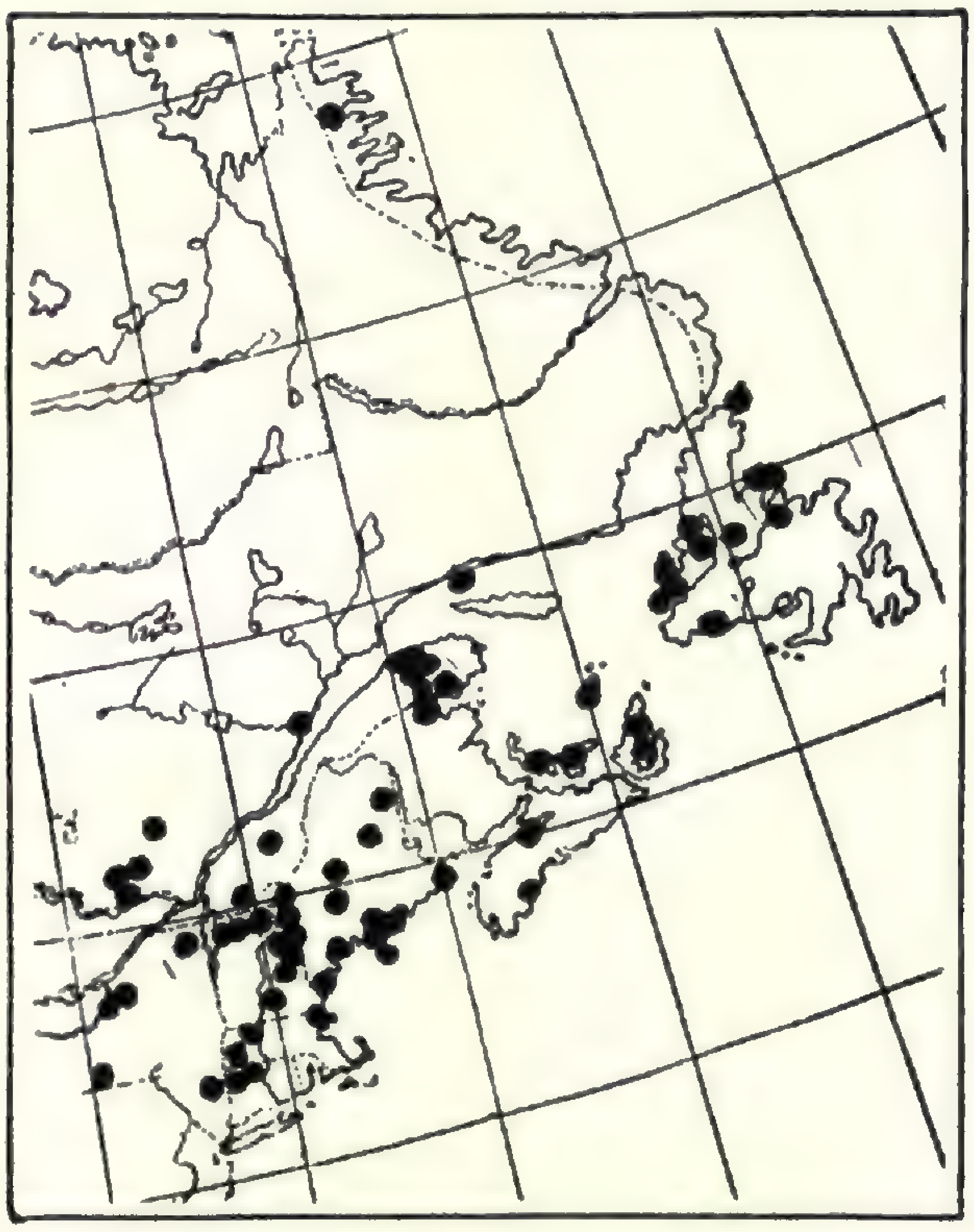
The sheaths, blades or spikes are more or less glaucous in the minor form or state:

A. caninum, var. *tenerum*, f. *Fernaldii* Pease & Moore, l. c., 73 (1910). *A. trachycaulum*, var. *glaucescens* Malte in H. F. Lewis, Can. Field-Nat. xlv. 201 (1931), name only, and Ann. Rep. 1930, Nat. Mus. Can. 45 (1932). *A. trachycaulum*, var. *Fernaldii* (Pease & Moore) Malte, l. c. 46 (1932).

The varietal name *Agropyron violaceum*, β. *virescens* Lange (1880) can hardly be taken up, although it is not impossible that Lange may have had our plant. Malte shows, however (pp. 38, 39), that there was great confusion as to its exact identity and that it is now "impossible to say what particular form it was." Although the type of *A. violaceum*, var. *majus*, for the loan of which I am indebted to Professor Hitchcock, has the rachillas scabrous rather than villous, it is otherwise quite like the common eastern plant and, in view of the inconstancy of this character in western material, it does not seem justifiable to reject this earliest available varietal name. The type of *A. pseudorepens* (*Rydberg*, no. 2018) is exactly the common plant of the shores of western Newfoundland and eastern Canada. The topotype (*Shear*, no. 272), collected on the same day, may well have come from the colony with the type. *A. caninum*, var. *Hornemanni* Pease & Moore was based on *Triticum biflorum*, β. *Hornemanni* Koch, which, according to Malte (p. 38), is *A. latiglume*. The plant of Pease & Moore is largely a short-spiked alpine extreme of *A. trachycaulum*, var. *majus*. As to the more or less glaucous phases of the variety which have been separated by Pease & Moore and by Malte, see the discussion on p. 166.

Var. **novae-angliae** (Scribn.), comb. nov. *A. novae-angliae* Scribn. in Brainerd, Jones & Eggleston, Fl. Vt. 9 (name), 103 (1900). *A. tenerum*, var. *novae-angliae* (Scribn.) Farwell, Rep. Mich. Acad. Sci. xxi. 355 (1920). *A. repens*, var. *novae-angliae* Scribn. & Sm. acc. to Farwell l. c. (1920) in synonymy. PLATE 243, FIGS. 7–9, and MAP 17.—

Acid to calcareous rock and gravel, bogs and open woods, northern Labrador to Alberta, south to Connecticut, southern New York, Michigan, Wisconsin, Nebraska, Colorado and Nevada. The following, selected from a large representation, are characteristic. LABRADOR: on granitic rock, river-delta at head of Nachvak Bay, *Woodworth*, no. 37. NEWFOUNDLAND: gravelly and rocky seashore, Snook's Arm, *Fernald & Wiegand*, no. 4689; bogs, Bishop Falls, *Fernald & Wiegand*, no. 4688; sandy beach, Sandy Lake, *Fernald & Wiegand*, no. 2685; partially shaded limestone escarpments, Burnt Cape, *Fernald & Long*, no. 27,437; gravelly strand, Southeast Arm, Bonne Bay, *Fernald & Wiegand*, no. 2692; serpentine gravel, The Tableland, Bonne Bay, *Fernald, Long & Fogg*, no. 1285; serpentine barrens, Blomidon, *Fernald & Wiegand*, nos. 2686, 2688; sandy flats, mouth of Blomidon Brook, Frenchman's Cove, *Mackenzie & Griscom*, no. 10,103; peaty and gravelly slopes, French (or Tweed) I., *Fernald, Long & Fogg*, no. 65; wet runs and boggy spots in limestone barrens, Table Mt., Port au Port Bay, *Fernald & Wiegand*, no. 2682; meadow in limestone barrens, Green Gardens, Cape St. George, *Mackenzie & Griscom*, no. 11,011; cobbly barrier-beach, Great Barachois (or Barasway Bay), Burgeo and La Poile, *Fernald, Long & Fogg*, no. 66; turfy sand-plain, Sand Beach, west of Burgeo, *Fernald, Long & Fogg*, no. 64. QUEBEC: boggy thicket, Ile Ste Génèvième, Mingan Ids., *St. John*, no. 90, 171; rich wooded banks, R. Ste. Anne des Monts, *Fernald & Collins*, no. 171; on hornblende schist, Mt. Albert, *Fernald & Collins*, no. 405; crevices and talus of serpentine, Ruisseau à la Neige, Mt. Albert, *Fernald & Collins*, no. 416; Coulée d'Approche, Mt. Albert, *Victorin et al.*, no. 17,828; turfy and mossy slopes, Mt. Fortin, *Fernald & Pease*, no. 24,910; gravelly beaches and flats of Bonaventure R., August 5–8, 1904, *Collins, Fernald & Pease;* gravel beaches and bars, Little Cascapedia R., July 29 and 30, 1904, *Collins, Fernald & Pease;* platières, R. Petite Cascapedia, *Victorin, Rolland &*



Map 17. Eastern Range of AGROPYRON TRACHYCAULUM, var. NOVAE-ANGLIAE.

Jacques, no. 33,282; trap cliff, Tracadigash Mt., Carleton, July 24, 1904, *Collins, Fernald & Pease;* shore, Tadousac, August 6, 1892, *Kennedy;* Cache R., Lac Tremblant, August 2, 1922, *Churchill;* Perkins, Papineau Co., *Malte*, no. 119,241; Mt. King, près de Hull, *Victorin*, no. 15,261; Blue Sea Lake, Hull Co., *Malte*, no. 119,246; Wakefield, *Malte*, no. 119,239; dry serpentine ledges and gravel, Black Lake, *Fernald & Jackson*, no. 12,027; ledges, Mt. Elephantis, Brome, July 30, 1902, *Churchill, Pease.* Magdalen Islands: sandy sea-strand, Alright I., *Fernald, Long & St. John*, no. 6936. Prince Edward Island: moist rich woods and springy larch swamp, Bloomfield, *Fernald, Long & St. John*, nos. 6940, 6941; larch swamp, Dundee, *Fernald, Long & St. John*, no. 6942. Nova Scotia: rocky flood-plain of Barrasois R., *Nichols*, no. 339; crest of boulder and gravel barrier-beach, Great Bras d'Or, Grand Narrows, *Fernald & Long*, no. 20,106; talus of gypsum cliffs near Fivemile R., *Pease & Long*, no. 20,102; sea-shore thicket, Port Mouton, *Bissell & Graves*, no. 20,105. New Brunswick: Dalhousie, *Malte*, no. 119,247. Maine: cedar swamp, Blaine, September 7, 1896, *Fernald;* Caribou bog, Crystal, August 16, 1900, *Fernald;* rock-shelves, Mt. Kineo, *Cushman*, no. 1909; dry bank, Dead River, *Fernald*, no. 576 (type of *A. caninum*, var. *Hornemanni*, f. *pilosifolium* Pease & Moore); dry rocky woods, Lubec, *Fernald*, no. 1366; granite ledges, Jordan Bluffs, Mt. Desert I., *Stebbins*, no. 625; ledgy shore, Dark Harbor, Islesboro, *Woodward, Bissell & Fernald*, no. 8817; Elwell Point, South Thomaston, *Bissell, Fernald & Chamberlain*, no. 8818; beach, Monhegan Island, August 8, 1921, *Churchill;* rocky woods, York, *Fernald & Long*, no. 12,732. New Hampshire: dry open ledges, Diamond Peaks, Dartmouth College Grant, *Pease*, no. 10,501; dry shaded cliffs, Devil's Slide, Stark, *Pease*, no. 17,448; dry roadside, West Milan, *Pease*, no. 13,791; dry gravelly soil, Gorham, *Pease*, no. 12,208; copse, Randolph, *Pease*, no. 1730; roadside, Whitefield, *Pease*, no. 14,426; talus, Mt. Webster, *Pease*, no. 11,722; roadside, Carroll, *Pease*, no. 16,590; among rocks, Jackson, July 10, 1880, *J. A. Allen;* dry woods, Three Mile I., Meredith, *Pease*, no. 2515; in sphagnum, Alstead, *Fernald*, no. 240. Vermont: Willoughby Mt., *Eggleston*, no. 2177 (from type station, acc. to label); Willoughby cliffs, August 10 and 12, 1883, July 24, 1886, *Faxon;* North Slide, Willoughby Mt., August 15, 1896, *Faxon;* base of Willoughby Mt., July 3, 1894, *Grout & Eggleston*, August 1, 1894, *Williams;* 4th of July Slide, Willoughby, July 1, 1896, *Kennedy*, August 15, 1896, *Faxon;* Smuggler's Notch, Mt. Mansfield, August 9, 1877, *Faxon*, July 10, 1894, *Eggleston;* dry ledge, South Burlington, June 27, 1912, *Knowlton.* Massachusetts: Pettingill's swamp, Newbury, August 12, 1897, *A. A. Eaton;* rocky woods, Shelburne Falls, July 6, 1921, *Churchill;* limestone hill near Harmon Pond, Sheffield, *Hoffmann.* Connecticut: dry rocky woods (granitic), Sharon, *Weatherby*, no. 4799; dry rocky open woods (granitic), Canaan, *Weatherby*, no. 4145. New York: Wallface Mt., alt. 3000 ft., *House*,

no. 9533; Dutchess Co., *Hoysradt;* Watertown (as *A. repens,* var. *glaucum*) *A. Gray,* N. Am. Gram. Cyp. no. 128; Brownsville, June 30, 1859, *Wm. Boott;* dry open woods, Danby, *Eames & MacDaniels,* no. 3564. ONTARIO: Britannia, *Malte,* no. 119,242; Kingston, July 27, 1897, *Fowler;* Peninsula, Lake Superior, *Malte,* no. 107,866. MICHIGAN: Isle Royale, *Cooper,* no. 176; Alpena, July 22, 1876, *H. Gillman;* Cheboygan, August, 1890, *Kofoid.* WISCONSIN: Solon Springs, August 14, 1915, *Allen & Davis.* MANITOBA: Lake Winnipeg Valley, 1857, *Bourgeau.* MINNESOTA: sand, aspen grove, North Boundary, Hubbard Co., *M. L. Grant,* no. 2915; Duluth, August 1, 1888, *Vasey* (type of *A. tenerum ciliatum* Scribn. & Sm., consequently of *A. tenerum trichocoleum* Piper, *A. caninum,* var. *tenerum,* f. *ciliatum* (Scribn. & Sm.) Pease & Moore and *A. trachycaulum,* var. *trichocoleum* (Piper) Malte; type in U. S. Nat. Herb.). SASKATCHEWAN: Whitehorse Lake, *Herriot,* no. 72,890; Carleton House, *Richardson.* SOUTH DAKOTA: Belle Fourche, *Griffiths,* no. 389a. NEBRASKA: Loup City, *J. M. Bates,* no. 5219. ALBERTA: Cataract Creek, *S. Brown,* no. 1482; Edmonton, *Malte,* no. 151,819; near Banff, July 14, 1891, *J. Macoun.* WYOMING: Pine Bluffs, *Nelson,* no. 3628, in part; steep slopes, Bridger Peak, *Goodding,* no. 1939; Bull Camp, Big Horn Mts., *T. A. Williams,* no. 2771. COLORADO: Arboles, *Baker,* no. 145; vicinity of Mt. Carbon, *Tidestrom,* nos. 3918, 4041. NEVADA: Ruby Valley, alt. 6000 ft., *Watson,* no. 1330; grassy flats, alt. 6300 ft., Gold Creek, *Nelson & Macbride,* no. 2096.

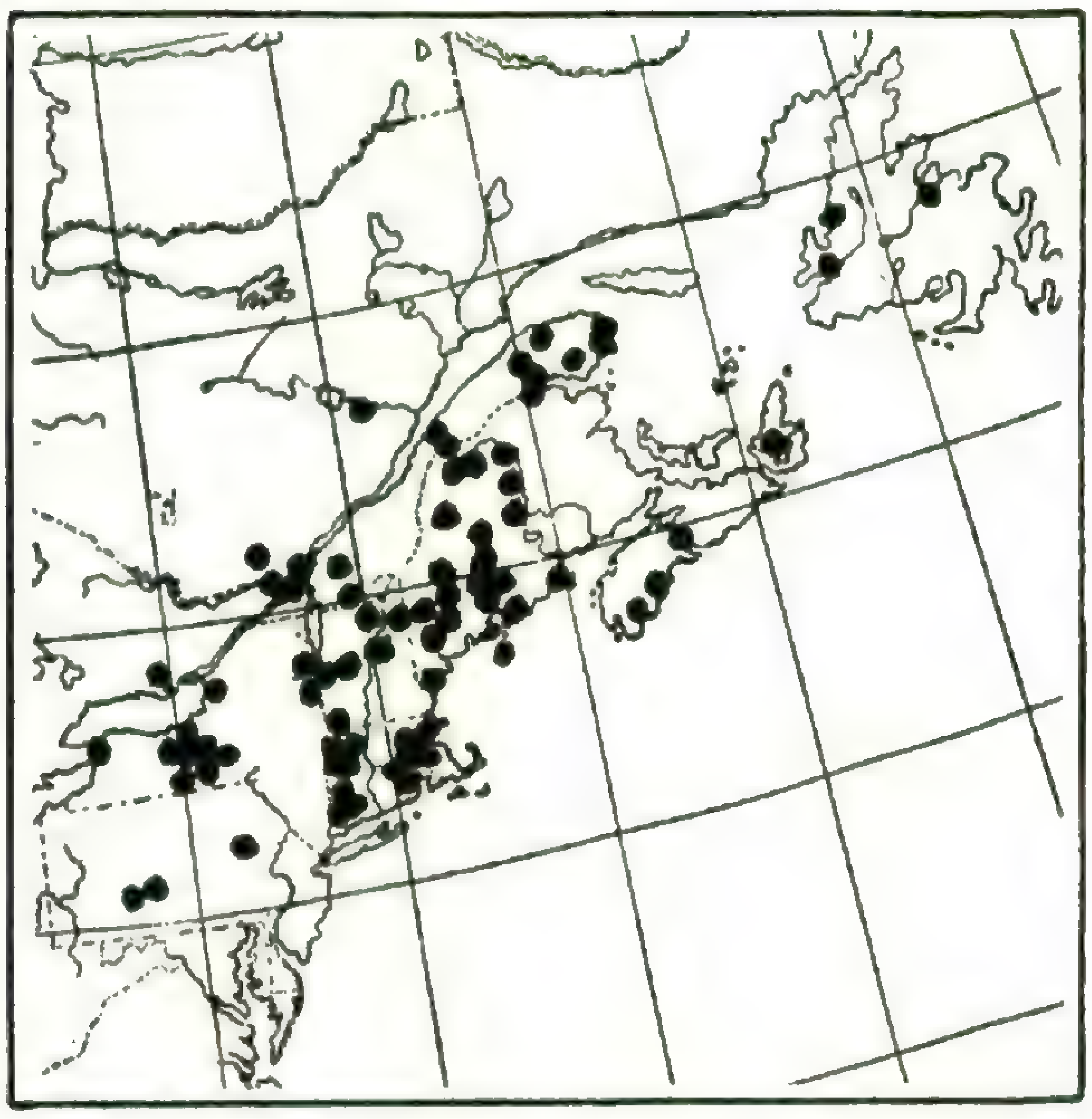
The individuals with trichomes present on some sheaths or blades have been called:

A. tenerum ciliatum Scribn. & Sm. U. S. Dept. Agric. Div. Agrost. Bull. no. 4: 30 (1897). *A. tenerum trichocoleum* Piper, Bull. Torr. Bot. Cl. xxxii. 546 (1905). *A. caninum,* var. *tenerum,* f. *ciliatum* (Scribn. & Sm.) Pease & Moore, RHODORA, xii. 72 (1910). *A. caninum,* var. *Hornemanni,* f. *pilosifolium* Pease & Moore, l. c. 75 (1910). *A. trachycaulum,* var. *trichocoleum* (Piper) Malte, Ann. Rep. 1930, Nat. Mus. Can. 45 (1932).

The frequent glaucous state has apparently received no special designation.

Var. GLAUCUM (Pease & Moore) Malte, Ann. Rep. 1930, Nat. Mus. Can. 47 (1932). *A. caninum,* f. *glaucum* Pease & Moore, RHODORA, xii. 71 (1910). *A. trachycaulum,* var. *caerulescens* Malte, l. c. (1932). PLATE 244, FIGS. 1–4, and MAP 18.—Rocky or gravelly shores, thickets, open woods and bogs, in basic to acid soils, Newfoundland to southern British Columbia, south to southern New England, Pennsylvania, Michigan, Wisconsin, Minnesota, Nebraska, Colorado, Nevada and California. From a large representation the following are cited as characteristic. NEWFOUNDLAND: ledges, talus and gravel by Exploits R., Bishop Falls, *Fernald & Wiegand,* no. 4684; shelves and talus of diorite cliffs, Western Head, Bonne Bay, *Fernald, Long &*

Fogg, no. 1284; boggy woods, Stephenville, *Fernald & Wiegand*, no. 2691. Quebec: St. John (or Douglastown) R., August 23, 1904, *Collins, Fernald & Pease;* sur les graviers, R. Dartmouth, *Victorin et al.*, no. 17,832; gravelly beach of R. Ste. Anne des Monts, *Fernald & Collins*, nos. 170, 170a; gravelly beaches and flats, Bonaventure R., August 5–8, 1904, *Collins, Fernald & Pease;* sur les graviers de la rivière, Matapedia, *Victorin*, no. 26,464; slaty ledges by Matapedia R., Assemetquagan, *Fernald & Pease*, no. 24,911; rocky bank, St. Alphonse, Chicoutimi Co., August 6, 1902, *Williams & Fernald;* margin of Bic R., Bic, *Fernald & Collins*, no. 915; Rivière du Loup, 1860, *Chas. Pickering*, July 21, 1861, *Wm. Boott;* Anse à Persil, Rivière du Loup, *Victorin*, no. 98; shore of Boundary Lake, Kamouraska, July 31, 1878, *Pringle, Horsford;* Buckingham, *Malte*, no. 119,244; Ile Lemieux, R. Ottawa, *Victorin*, no. 15,262; pinière de la Trappe, Oka, *Victorin & Rolland*, no. 33,140; dry woods, Mt. Beloeil, *Pease*, no. 12,953; Elephantis Landing, Brome, *Pease*, no. 147. Nova Scotia: thicket at upper border of gravel beach, Great Bras d'Or, Kidstone I., *Fernald & Long*, no. 20,100; thickets and upper border of shingly beach, Shubenacadie Grand Lake, *Fernald, Bartram & Long*, nos. 23,338, 23,339; wet thickets and swales, Lahave R., Bridgewater, *Fernald & Long*, no. 23,341; crest of barrier beach, East Jordan, *Fernald & Long*, no. 23,340. New Brunswick: Junction of Matapedia and Restigouche Rivers, *Malte*, nos. 119,249, 119,251; Grand Falls, August 13, 1873, *Wm. Boott;* Lily Lake, St. John, August 10, 1873, *Wm. Boott.* Maine: shore of St. John R., Fort Kent, *Pease*, no. 2579; gravelly shores, Aroostook R., Fort Fairfield, *Fernald*, no. 196; cedar swamp, Mars Hill, *Fernald*, no. 575; recent clearings and railroad embankments, Houlton, *Fernald & Long*, no. 12,728; open woods, City Camp to Roebar's, Wassataquoik R., July 17, 1900, *Fernald;* argillaceous ledges by Penobscot R., Winn, *Fernald & Long*, no. 12,727; bogs, Oldtown, July, 1890, *F. P. Briggs;* exposed argillaceous ledges along Penobscot R., Hampden, *Fernald & Long*, no.



Map 18. Eastern Range of Agropyron trachycaulum, var. glaucum.

12,731; thicket above springy, limy gravel-beach of St. John R., Township ix, Range 17, Somerset Co., *St. John*, no. 2142; dry river-thicket, Mercer, August 6, 1913, *Knowlton;* open woods, Farmington, *Fernald*, no. 574; thin soil on ledges, Hartford, *Parlin*, no. 1427; calcareous strand, Kelly Point, Pembroke, July 31, 1909, *Fernald*, no. 1367 (TYPE of *A. caninum*, f. *glaucum* Pease & Moore, consequently of *A. trachycaulum*, var. *glaucum* (Pease & Moore) Malte); crevices of dry granite, Kelly Point, Pembroke, *Fernald*, no. 1368; rocks, Winter Harbor, *Stebbins*, no. 3913; deciduous hillside-woods, Dedham, *Fernald & Long*, no. 12,729; granite ledges, Frankfort, *Fernald & Long*, no. 12,730; wet bank in woods, Rockland, *C. A. E. Long*, no. 662; crevices of cliff, Monhegan Island, August 10, 1921, *Churchill;* wooded terrace of Kennebec R., Vassalboro, *Fernald*, no. 12,726; North Berwick, *Parlin*, no. 571. NEW HAMPSHIRE: railroad embankment, Randolph, *Pease*, nos. 16,887, 17,195, 19,847; near Upper Baker Pond, Piermont, August 1, 1908, *Williams*. VERMONT: Willoughby, July 21, 1898, *Kennedy;* Twin Mt., West Rutland, *Eggleston*, no. 2473; serpentine outcrop, Roxbury, July 18, 1916, *E. J. Winslow;* cliffs, North Pownal, August 1, 1898, *Churchill*. MASSACHUSETTS: Major Heywood path, Concord, July 1, 1859, *H. D. Thoreau;* Conantum Cliff, Concord, *E. S. Hoar;* dry rocky (diorite) hillside-woods, Horn Pond Hill, Woburn, *Fernald & Long*, no. 8815; rock in woods, Stoneham, July 4, 1894, *W. P. Rich;* High Rock woods, Needham, June 22, 1890, *T. O. Fuller;* damp thicket east of Morse's Pond, Wellesley, July 20, 1912, *Wiegand;* Neponset meadows, Canton, June 22, 1899, *Kennedy;* woods, Ashfield, July 19, 1909, *Williams;* dry rocky upland woods, North Adams, *Fernald & Long*, no. 8816; rocky summit, West Stockbridge Mt., July 18, 1911, *Hoffmann;* rocky ledge, slope of Monument Mt., Great Barrington, July 6, 1906, *Hoffmann;* limestone ledge, Sheffield, July 30, 1914, *Hoffmann*. CONNECTICUT: Wauregan, *J. L. Sheldon*, no. 657; dry thicket, Somers, July 20, 1904, *Bissell;* roadside bank, Union, *Weatherby*, no. 4776; moist meadow, Waterbury, *Blewitt*, no. 324; dry ledge, Waterbury, *Blewitt*, no. 3637; low wet field, Brookfield, *Blewitt*, no. 1885; sphagnous swampy meadow, Bethel, *Eames*, no. 10,973. NEW YORK: thin soil on rocks, Peaked Mt., West Fort Ann, July 16, 1918, *Burnham;* Glen Lake, September 20, 1916, *Burnham;* Axton, July 14, 1899, *Rowlee, Wiegand & Hastings;* Watertown, *A. Gray*, N. Am. Gram. Cyp. no. 129; open woods, Thatcher's Pinnacle, Danby, *Metcalf*, no. 5850; dry woods, Estey's Glenn, Lansing, *Metcalf*, no. 5848; dry scrubby hillside, Caroline, *Wiegand*, no. 9283; rocky banks, Enfield, *Metcalf*, no. 5849; open woods, Ithaca, *Metcalf*, no. 5847; Sullivan Hill (on some labels "Crest of Mt. Zoar"), Chemung Co., *T. F. Lucy*, no. 11,603; Penn Yan, *Sartwell;* marl openings, Bergen Swamp, *Wiegand*, no. 9282; Buffalo, *Clinton;* Niagara Falls, July, 1836, *Carey*. PENNSYLVANIA: Pocono Mts., August 2, 1860, *Porter;* (Porter, on his label, also reports it from barrens of Huntingdon Co. and from Blair

Co.). Ontario: dry rocky ground, Hastings Co., June 2, 1865, *J. Macoun;* beach of Agawa R., Frater, *Pease*, no. 18,068. Michigan: Isle Royale, *Cooper*, no. 175; bluffs, Keweenaw Co., *Farwell*, no. 760; Sulphur I., Thunder Bay, July 13, 1895, *C. F. Wheeler;* low sandy woods, Bay Port, September 10, 1902, *C. R. Ball;* very dry and poor ground in woods, Sand Point, Huron Co., *C. K. Dodge*, no. 22; Jackson, July 11, 1838, *Houghton*. Wisconsin: beach of L. Michigan, Sturgeon Bay, *Schuette*, no. 155; Scott, Brown Co., July 10, 1898, *Schuette;* river-bank, Allouez, July 17, 1882, *Schuette;* Beloit, 1860, *T. J. Hale;* Wild Rose, July 3, 1918, *J. J. Davis*. Minnesota: sand, aspen clearing, Clearwater Co., *M. L. Grant*, no. 3119; rocks, Thomson, *Sandberg*, no. 407; wooded slope, sandstone outcrop, Sheldon Valley, *Rosendahl*, no. 3816. Nebraska: wet meadow, near Whitman, Grant Co., *Rydberg*, no. 1617. Alberta: small meadow, Buffalo Prairie, Jasper Park, *J. M. Macoun*, nos. 98,043, 98,044; N. E. Branch of Saskatchewan, *S. Brown*, no. 1497; Banff, *Malte*, no. 108,310 (var. *caerulescens* Malte, cited by him). Montana: East Gallatin swamps, alt. 5000 ft., *Rydberg*, no. 3191. Wyoming: Cache Creek, *Tweedy*, no. 625; Sundance, *T. A. Williams*, no. 2862; Fort Bridger, August 5, 1873, *Porter*. Colorado: Twin Lakes, *J. Wolf*, no. 1168; Canyon City, alt. 5300 ft., Fremont Co., *Shear*, no. 960; dry soil among bushes, alt. 7000 ft., Mancos, *Baker, Earle & Tracy*, no. 440. Idaho: dry soil among rocks, St. Anthony, *Merrill & Wilcox*, no. 130. Nevada: King's Canon, alt. 1700–2000 m., Ormsby Co., *Baker*, no. 1286. California: open woods, Idyllwild, San Jacinto Mts., *M. F. Spencer*, no. 1231. Washington: dry slopes near Conconully, Okanogan Co., *J. W. Thompson*, no. 6941. British Columbia: Cameron Lake, Vancouver I., *W. R. Carter*, no. 950; Comox, Vancouver I., *Malte*, no. 107,855 (type of var. *caerulescens* Malte).

The earliest varietal name applicable to the common American *Agropyron "caninum"* is var. *glaucum*, a bit innappropriate, since most of the material is not strikingly, if at all, glaucous. The common, green and glabrous phases of the plant are:

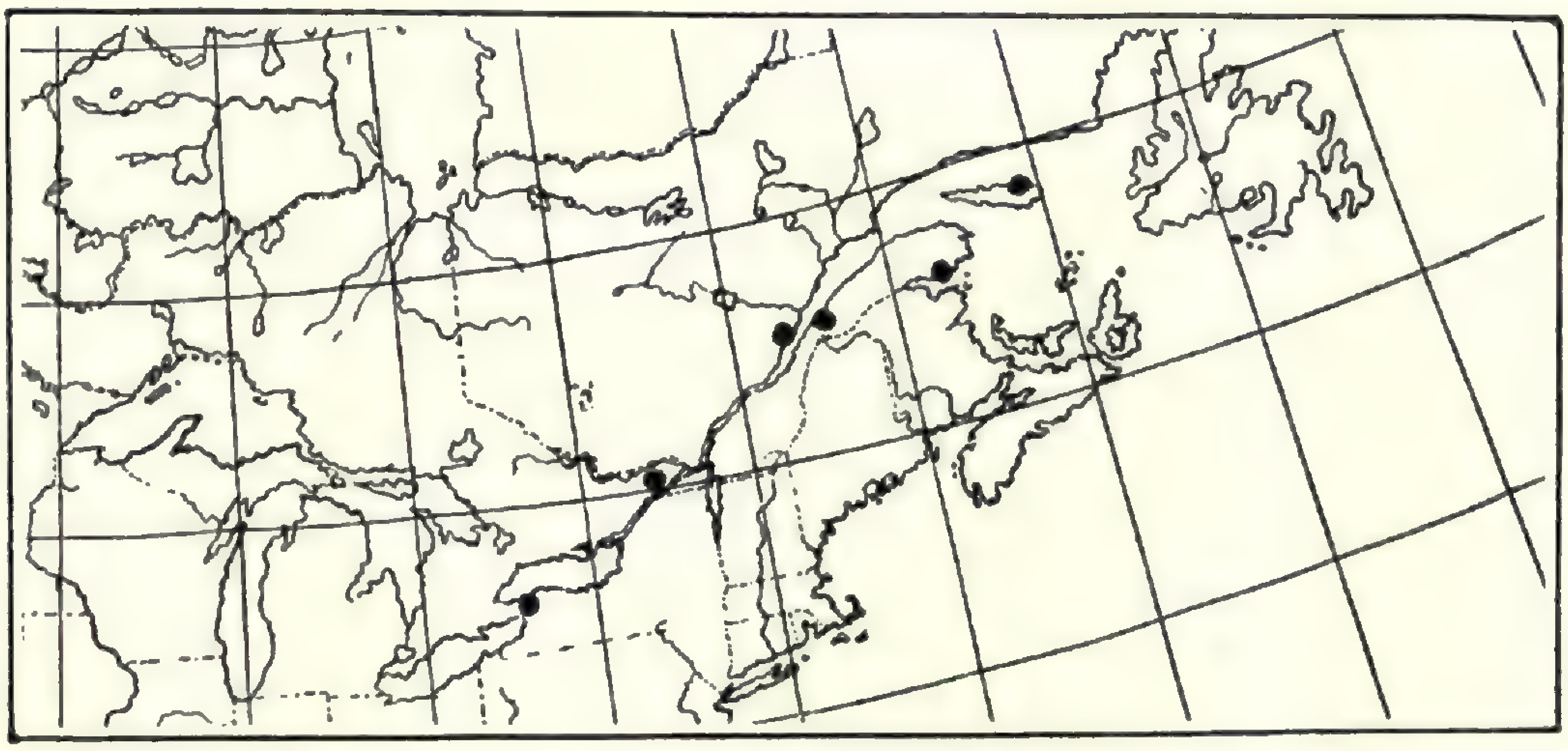
A. caninum of most American authors, not *A. caninum* (L.) Beauv. of Eurasia.

Triticum subsecundum Link, Hort. Bot. Berol. ii. 190 (1833).

Individuals of the green plant with more or less pubescence on some of the sheaths or blades have been called *A. caninum*, f. *pubescens* Pease & Moore, l. c. (1910). The plants examined by them have glabrous culms and variable, though not excessive pubescence on the foliage. They took their name from *A. caninum pubescens* Scribn. & Sm. U. S. Dept. Agric. Div. Agrost. Bull. no. 4: 29 (1897). The type of Scribner & Smith's subspecies, most kindly loaned me by Professor Hitchcock, is a very extreme variation, if not another species, quite

unlike anything else which I have seen: with blades and sheaths all densely villous-tomentose, the tomentum also on the culms. No other material of the aggregate *A. trachycaulum* has been seen with positively pubescent culms. In view of the constancy of this character in species of *Muhlenbergia, Bromus,* and in some other genera of the *Gramineae* the rare western plant deserves further attention.

Var. UNILATERALE (Cassidy) Malte, Ann. Rep. 1930, Nat. Mus. Can. 46 (1932), in part (including name-bringing synonym). *A. Richardsoni* Schrad. Linnaea, xii. 467 (1838). *A. unilaterale* Cassidy, Colo. State Agric. Coll. Expt. Sta. Bull. no. 12: 63 (1890), not *A. unilaterale* Beauv. Agrost. 102 (1812). *A. caninum,* var. *unilaterale* (Cassidy) Vasey, Contrib. U. S. Nat. Herb. i. 279 (1893). *A. caninum,*



Map 19. Eastern Range of AGROPYRON TRACHYCAULUM, var. UNILATERALE.

f. *violascens* Ramaley, Geol. Nat. Hist. Surv. Minn.—Minn. Bot. St. no. 9: 3, 107 (1894). *A. violaceum,* f. *caninoides* Ramaley, l. c. 9, 108 1894). *A. violascens* (Ramaley) Beal, Grasses N. Am. ii. 635 (1896). *A. caninoides* (Ramaley) Beal, l. c. 640 (1896). *A. caninum,* var. *Richardsoni* (Schrad.) M. E. Jones, Contrib. West. Bot. xvi. 18 (1912). *A. trachycaulum,* var. *Richardsoni* (Schrad.) Malte in H. F. Lewis, Can. Field-Nat. xlv. 201 (1931). PLATE 244, FIGS. 5–7, and MAP 19.—Meadows, thickets and limy rocks, borders of Gulf and lower River St. Lawrence, Quebec; Ontario and western New York to British Columbia, south to Wisconsin, Iowa, South Dakota, Colorado, Nevada and Oregon. QUEBEC: sur les platières, Riv. au Saumon, Anticosti, *Victorin & Rolland,* no. 27,886, as *A. repens;* sur les talus secs, R. Natiskotek, Anticosti, *Victorin & Rolland,* no. 27,895 (transition to var. *majus*); alluvial islands at mouth of Bonaventure R., August 4, 1904, *Collins, Fernald & Pease;* sur les ilôts cambriens dits "Les Razades," Trois Pistoles, *Victorin, Rolland & Jacques,* no. 34,008;

vicinity of Cap à l'Aigle, *J. Macoun*, no. 68,982 (approaching var. *glaucum*). MAINE: in agris (doubtless introduced in western wool[1]), North Berwick, June 24, 1898, *Parlin*. NEW YORK: Buffalo, *Clinton*. ONTARIO: Kemptville, *Malte*, no. 119,243. WISCONSIN: railroad track to Murphy's mill, Green Bay, July 8, 1897, *Schuette;* Scott, Brown Co., June, 1885, *Schuette*. IOWA: Little Rock, *C. R. Ball*, no. 554; Jewell Junction, *G. W. Carver*, no. 255. NORTH DAKOTA: prairies, Leeds, July 8, 1901, *Lunell*. SOUTH DAKOTA: Brookings, July 10, 1894, *Thornber*. SASKATCHEWAN: without locality, 1858, *Bourgeau*. ALBERTA: Dunvegan, Peace R., *J. M. Macoun*, no. 59,546; Brazeau, *S. Brown*, no. 1432; Devil's Head Lake, August 3, 1891, *J. Macoun;* Banff, *Butters & Holway*, no. 313. MONTANA: dry hillsides, Hound Creek Valley, alt. 4500 ft., *Scribner*, no. 422 (cotype of *A. Richardsoni ciliatum* Scribn. & Sm., consequently of *A. caninum*, var. *unilaterale*, f. *ciliatum* (Scribn. & Sm.) Pease & Moore and of *A. trachycaulum*, var. *ciliatum* (Scribn. & Sm.) Malte); Dry Fork of Belt Creek, *Rydberg*, no. 3352 (one individual green, one glaucous). WYOMING: Laramie, *E. D. Merrill*, no. 23. COLORADO: wet ground in the higher mountains, near Golden City, *Greene*, no. 446; Veta Pass, 1886, *Vasey;* Dillon, *Shear*, no. 1067; alpine, moist bottoms, Hahn's Peak, Routt Co., *Goodding*, no. 1705. NEVADA: Incline, Lake Tahoe, *P. B. Kennedy*, no. 1439. OREGON: Dale's, Blue Mts., *Griffiths & Hunter*, no. 111. WASHINGTON: Loomis, *Griffiths & Cotton*, no. 340. BRITISH COLUMBIA: Field, *J. Macoun*, no. 64,790; Comox, *J. Macoun*, no. 50.

Individuals with more or less pubescence on at least the lowest sheaths have been called:

A. Richardsoni ciliatum Scribn. & Sm. U.S. Dept. Agric. Div. Agrost. Bull. no. 4: 29 (1897). *A. caninum*, var. *unilaterale*, f. *ciliatum* (Scribn. & Sm.) Pease & Moore, RHODORA, xii. 76 (1910). *A. trachycaulum*, var. *ciliatum* (Scribn. & Sm.) Malte, l. c. 47 (1932).

Although Cassidy seems to have left no type (acc. to personal letter from Professor Ernest C. Smith) to stand for *Agropyron unilaterale*, his description can have been based on nothing else than the long-awned ("2 inches") *A. Richardsoni;* therefore, the inappropriate (or at least undistinctive) name *unilaterale*, as the first one used in the varietal category, has to be maintained.

THE AMERICAN VARIATIONS OF AGROPYRON REPENS.—The ubiquitous *Agropyron repens* (L.) Beauv. is excessively variable and it has repeatedly been segregated into minor species and varieties. As it occurs in North America, apparently indigenous along the coast from

[1] Along with *Bromus marginatus* Nees, *Puccinellia Nuttalliana* (Schultes) Hitchc., *Bouteloua spp.*, *Chloris spp.*, *Sporobolus spp.;* *Monolepis chenopodioides* Moq., *Lappula Redowskii* (Hornem.) Greene, var. *occidentalis* (Wats.) Rydb., *Aster frondosus* (Nutt.) T. & G., *Hymenatherum aureum* Gray and many other western plants thus locally introduced.—See J. C. Parlin, RHODORA, vi. 81 (1904).

Newfoundland and the lower St. Lawrence to New England and introduced as an obnoxious weed in eastern Canada and the northeastern States and to a minor degree in the Northwest, it appears in several striking forms. Although conspicuous in their extremes, these all seem to intergrade; and essentially all of them may have either green or glaucous or pilose- or glabrous-sheathed phases. Such divergences are often very striking to the eye but as these tendencies are found indiscriminately in the awnless or long-awned, broad-glumed or narrow-glumed forms of the species I cannot look upon them as of taxonomic importance comparable with the variations of the spikelets.

Two very marked trends occur in the glumes. In the majority of weed-colonies in the East the glumes are oblong to narrowly elliptic and broadly scarious-margined (PLATE 245, FIGS. 1 and 2). In the larger mass of material of the sea-beaches, though sometimes in the weedy plants of the interior, the glumes are lanceolate and prolonged from near the middle to the tapering tip and with narrower or inrolling margins (FIGS. 3 and 4). In each of these series the rachis may be glabrous or pilose and the lemmas awnless or long-awned. It is, therefore, very difficult to interpret the many European descriptions which, emphasizing one point (the pilose rachis or the presence of awns, for instance), ignore the others. But, since it is desirable to have some names by which to designate our forms, I am appending the following wholly tentative arrangement of them, distinctly understanding that the names may eventually have to be altered, when a series is closely studied in connection with the European types. The two major trends I am treating as true varieties; the parallel variations under them seem better considered as forms.

a. Glumes oblong, rounded or rather abruptly narrowed at apex, with broad scarious margin....*b.*
- *b.* Rachis glabrous except for ciliate edges....*c.*
  - *c.* Glumes and lemmas blunt, acute or merely subulate-tipped.................................... *A. repens* (typical).
  - *c.* Glumes or especially the lemmas definitely awned..Forma *aristatum.*
- *b.* Rachis pilose or hirsute....*d.*
  - *d.* Glumes and lemmas blunt, acute or merely subulate-tipped.................................Forma *trichorrhachis.*
  - *d.* Glumes and lemmas definitely awned...............Forma *pilosum.*

a. Glumes lanceolate, gradually tapering from near the middle to the apex; margin narrow or inrolled....*e.*
- *e.* Rachis glabrous except for ciliate edges....*f.*
  - *f.* Glumes and lemmas blunt, acute or merely subulate-tipped Var. *subulatum.*
  - *f.* Glumes and especially the lemmas definitely awned Forma *Vaillantianum.*
- *e.* Rachis pilose or hirsute....*g.*

g. Glumes and lemmas blunt, acute or merely subulate-tipped .... Forma *heberhachis*.
g. Glumes and lemmas definitely awned .... Forma *setiferum*.

A. REPENS (L.) Beauv. Agrost. 146 (1812). *Triticum repens* L. Sp. Pl. i. 86 (1753).—Gravelly coast, Newfoundland and eastern Quebec to Maine; a dominant and aggressive weed south to southern New England and west to Minnesota and Iowa; Alaska to California. (Eu.) PLATE 245, FIG. 1.

Forma ARISTATUM (Schum.) Holmb. Skand. Fl. hft. 2: 274 (1926). *Triticum repens*, var. *aristatum* Schum. Enum. Pl. Saell. ii. 38 (1803).—Coast, Newfoundland and eastern Quebec to southern New England; as a weed inland to Minnesota; Alaska to Oregon. PLATE 245, FIG. 2.

Forma TRICHORRHACHIS Rohlena, Böhm. Ges. Wiss. Math. Nat. Cl. no. xxiv. 5, 8 (1899). *Triticum repens*, var. *β. pubescens* Döll, Fl. Baden. 129 (1857), not M. Bieb. *A. repens*, sub-var. *pubescens* (Döll) Rouy, Fl. France, xiv. 317 (1913). *A. repens*, f. *pubescens* (Döll) Holmb. Skand. Fl. hft. 2: 274 (1926).—Newfoundland and Saguenay Co., Quebec to Connecticut and western New York; Oregon.

Forma **pilosum** (Scribn.) comb. nov. *A. repens*, var. *pilosum* Scribn. in Rand & Redfield, Fl. Mt. Desert, 183 (1894).—Gaspé Peninsula, Quebec to Connecticut and Michigan.

The material from Southwest Harbor upon which Scribner based his var. *pilosum* was partly awnless (f. *trichorrhachis*), partly awned. The specimens on the sheet bearing his annotations have long awns and I am designating this material as the type.

Var. SUBULATUM (Schreb.) Reichenb. Ic. Fl. Germ. i. t. xx. fig. 1385 (1834). *Triticum subulatum* Schreb. in Schweig. & Körte, Fl. Erl. i. 143 (1804).—Coast, Newfoundland and Saguenay Co., Quebec to Connecticut; and as a weed south to New Jersey and westward to Minnesota, Iowa and Missouri; Wyoming and Oregon. PLATE 245, FIG. 3.

Forma **Vaillantianum** (Wulf. & Schreb.), comb. nov. *Triticum Vaillantianum* Wulf. & Schreb. in Schweig. & Körte, Fl. Erl. i. 143 (1804). *A. repens*, var. *Vaillantianum* (Wulf. & Schreb.) Reichenb. Ic. Fl. Germ. i. t. xx. fig. 1387 (1834).—Sea-shores, Newfoundland and Magdalen Islands to Massachusetts; and as a weed to Pennsylvania and Wisconsin and in Washington and Oregon. PLATE 245, FIG. 4.

Forma **heberhachis**, f. nov., var. subulato simile, rhachi piloso.—Newfoundland to Rhode Island. TYPE: roadsides, waste places and ballast land, Yarmouth, Nova Scotia, July 24, 1920, *Long & Linder*, no. 20,091 (in Gray Herb.).

Forma **setiferum**, f. nov., forma *Vaillantiano* simile, rhachi piloso.—On the coast, Newfoundland to Long Island, inland to saline soils of western New York. TYPE: Chelsea Beach, MASSACHUSETTS, July 15, 1868, *Wm. Boott* (Gray Herb.).

The Newfoundland specimens of these varieties and forms of *Agropyron repens* before me are the following.

A. REPENS (L.) Beauv. (typical). AVALON PENINSULA: Murray's Pond, 1932, *A. M. Ayre;* INGORNACHOIX BAY: damp shores, Port Saunders, *Fernald, Wiegand & Kittredge*, no. 2679. BAY of ISLANDS: door yard, Frenchman's Cove, *Mackenzie & Griscom*, no. 10,100.

*A. REPENS, f. ARISTATUM (Schum.) Holmb. PORT AU PORT BAY: sand flats back of beach, 4 miles north of Port au Port, *Mackenzie & Griscom*, no. 10,101. BAY ST. GEORGE: dry sand, Stephenville Crossing, *Mackenzie & Griscom*, no. 10,104*a*.

*A. REPENS, f. TRICHORRHACHIS Rohlena. AVALON PENINSULA: roadsides, St. John's, August 4, 1894, *Robinson & Schrenk*. PORT AU PORT BAY: sandy ground back of beach, 4 miles north of Port au Port, *Mackenzie & Griscom*, no. 10,101*a*. BAY ST. GEORGE: dry sand, Stephenville Crossing, *Mackenzie & Griscom*, no. 10,104.

*A. REPENS, var. SUBULATUM (Schreb.) Reichenb. AVALON PENINSULA: Colinet, 1932, *A. M. Ayre*. VALLEY OF THE GANDER: dry gravelly railroad bank, Glenwood, *Fernald, Wiegand & Darlington*, no. 4682. ST.-PIERRE ET MIQUELON: sables et galets maritimes, Dunes du Grand Étang de Miquelon, *Arsène*, no. 84.

*A. REPENS, var. SUBULATUM, f. VAILLANTIANUM (Wulf. & Schreb.) Fern. AVALON PENINSULA: Murray's Pond, 1932, *A. M. Ayre*. BONNE BAY: thicket bordering marl-pond, Storehouse Cove, *Fernald, Long & Fogg*, no. 1279.

*A. REPENS, var. SUBULATUM, f. HEBERHACHIS Fern. BAY OF ISLANDS: wet openings in woods at about 900 ft. alt., Blomidon, *Eames & Godfrey*, no. 5877.

*A. REPENS, var. SUBULATUM, f. SETIFERUM Fern. VALLEY OF THE EXPLOITS: ledges and talus, Grand Falls, *Fernald, Wiegand, Bartram & Darlington*, no. 4683.

(*To be continued*)

CALLITRICHE ANCEPS IN NEW ENGLAND.—In 1908 I described from mountain-ponds of the Gaspé Peninsula a tiny *Callitriche*, as *C. anceps*, RHODORA, X. 51 (1908). Subsequently *C. anceps* has proved to be a generally distributed species in boreal eastern America: Greenland, the Labrador Peninsula, Newfoundland and the Gaspé Peninsula. A heretofore unidentified collection by the late *Charles E. Faxon* from Lake of the Clouds, Mt. Mansfield, Vermont, August 6, 1877, now brings the range of *C. anceps* into New England and the United States. It is desirable to search for it in the subalpine ponds of Mt. Katahdin, the White Mountains and the Adirondacks. In the original

discussion the following possibly helpful phrase occurs: "distinguished from *C. heterophylla* by its small size, uniform foliage, ancipital stem, and promptly deciduous styles." Subsequently plants with dilated foliage have been found but the ancipital stems and caducous styles are distinctive.—M. L. Fernald.

Epidemic among Zostera Colonies—In a previous note[1] the writer drew attention to a widespread destruction of *Zostera marina* var. *stenophylla* Aschers. and Graeber[2] with which he was familiar on the New England coast. It appears that the New Jersey area suffers quite as much as the more northern parts of the coast from this destruction, and the matter has received some notice from the public press[3] as of critical importance in connection with the usefulness of the great coastal feeding areas for ducks and similar birds. In Canada this has attracted much attention.[4] The condition is described as a disease of unknown origin, and subsequent repopulation of denuded areas is reported. A point of great interest is the fact that this condition has appeared in Europe on the form of Zostera native there, with much the same destructive effect.[5] Here it appeared in 1931 in the region of St. Malo and involves colonies all along the Atlantic French and Netherlands coasts. A bacterial organism has been isolated from the diseased plants which may be the cause of the necrotic phenomena. It is to be hoped that coastal New England botanists will make a careful survey, in 1933, of the areas familiar to them with reference to any spread or contraction of the denuded areas.—Wm. Randolph Taylor, University of Michigan.

[1] Lewis, I. F. and W. R. Taylor. Notes from the Woods Hole Laboratory—1932. Rhodora 35: 153. 1933.

[2] Fernald, M. L. Recent discoveries in the Newfoundland flora. Rhodora 35: 92. 1933.

[3] Cape May (N. J.) "Star and Wave," 5 Jan. 1933, and the Trenton (N. J.) "Times" 30 Jan. 1933, for which references acknowledgement is made to H. G. Richards.

[4] Huntsman, A. G. Disease in Eel Grass. Progress Reports, Atlantic Biol. Sta. and Fisheries Exp. Sta. No. 5: 11–14. Oct. 1932.

[5] Fischer-Piette, E., R. Heim and R. Lami. Note préliminaire sur une maladie bactérienne des Zostères. Comptes Rendus Acad. Sci. Paris 195: 1420–1422. 1932.

Volume 35, no. 412, including pages 111–146 and 4 plates, was issued 5 March, 1933.

Inflorescences, × 1. Fig. 1, Agropyron repens; fig. 2, A. repens, forma aristatum; fig. 3, A. repens, var. subulatum; fig. 4, var. subulatum, forma Vaillantianum; fig. 5, A. pungens.

JUN 27 1933

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB

Conducted and published for the Club, by

MERRITT LYNDON FERNALD, Editor-in-Chief

JAMES FRANKLIN COLLINS
CHARLES ALFRED WEATHERBY } Associate Editors
LUDLOW GRISCOM

Vol. 35. June, 1933. No. 414.

CONTENTS:

Types of some American Species of Elymus. *M. L. Fernald* 187

Notes from the Herbarium of the University of Wisconsin.—IX. *N. C. Fassett* 199

Recent Discoveries in the Newfoundland Flora (continued). *M. L. Fernald* 203

Habitat of Astrophytum asterias in Texas. *E. U. Clover* 223

Note on Glyceria neogaea. *Leon Kelso* 225

Wolffiella lingulata in Louisiana. *S. F. Blake* 226

The New England Botanical Club, Inc.

8 and 10 West King St., Lancaster, Pa.

Room 1001, 53 State St., Boston, Mass.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price, $2.00 per year, net, postpaid, in funds payable at par in United States currency in Boston; single copies (if available) 20 cents. Volumes 1–8 or some single numbers from them can be supplied only at advanced prices which will be furnished on application. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be considered for publication to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than two pages of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

M. L. FERNALD, 14 Hawthorn Street, Cambridge, Mass.

Subscriptions (making *all remittances* payable to RHODORA) to

Ludlow Griscom, 8 W. King St., Lancaster, Pa., or Museum of Comparative Zoology, Cambridge, Mass.

Entered at Lancaster, Pa. Post Office as Second Class Mail Matter.

INTELLIGENCER PRINTING COMPANY

Specialists in Scientific and Technical Publications

EIGHT WEST KING ST., LANCASTER, PA.

CARD-INDEX OF NEW GENERA, SPECIES AND VARIETIES OF AMERICAN PLANTS, 1885 TO DATE.

For American taxonomists and all students of American plants the most important supplement to the Index Kewensis, this catalogue in several ways exceeds the latter work in detail, since it lists not only the flowering plants, but ferns and other vascular cryptogams, and includes not merely genera and species, but likewise subspecies, varieties and forms. A work of reference invaluable for larger herbaria, leading libraries, academies of sciences, and other centers of botanical activity. Issued quarterly, at $22.50 per 1000 cards.

GRAY HERBARIUM of Harvard University,
Cambridge, Mass., U. S. A.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. Day. Leatherette. Pocket size. Invaluable for collector's memoranda and herbarium records. Published and sold by the Gray Herbarium, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

MEMOIRS OF THE GRAY HERBARIUM. A series of illustrated quarto papers issued at irregular intervals, sold separately.

No. III. The Linear-leaved North American Species of Potamogeton, Section Axillares, by M. L. Fernald. 183 pp., 40 plates, 31 maps. 1932. $3.00.

Gray Herbarium of Harvard University, Cambridge, Mass.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3/4 in. 1 year $4.00, 6 months $2.50.

AGROSTIS SCABRA, var. SEPTENTRIONALIS: FIG. 1, portion of panicle, × 1, from Bonne Bay, Newfoundland; FIG. 2, mature spikelets, × 6.

A. HYEMALIS: FIG. 3, young panicle, × 1, from Pennsylvania; FIG. 4, mature panicle, × 1, from New York; FIG. 5, mature spikelets, × 6, from Illinois.

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 35. **June, 1933.** **No. 414.**

TYPES OF SOME AMERICAN SPECIES OF ELYMUS[1]

M. L. Fernald

In 1918 Professor K. M. Wiegand[2] greatly clarified our understanding of *Elymus* by pointing out more substantial specific characters than had been generally recognized; and every student of grasses is indebted to him for his elucidation of the differential characters. In some cases, however, the exact identities of species were left by him in an unsatisfactory state or were unfortunately assumed, without knowledge of the types involved. This is notably so in regard to *E. canadensis* L. Wiegand identifies as *E. canadensis* L. Sp. Pl. i. 83 (1753) a plant of alluvial soil, from "Gaspé County, Quebec, to the interior of Maine, New Hampshire, Vermont, western Massachusetts, northern Connecticut, and northern and central New York," very distinct in its thin and broad (1.3–2.4 cm.) leaves, villous or pilose on the upper surfaces; in its extremely lax inflorescence, with remote joints; in its glumes mostly only 1.5–2 cm. long; and in its spikelets with 4–7 florets. Contrasted with the *E. canadensis* of Wiegand in the Atlantic states and adjacent Canada is *E. robustus* Scribn. & Sm., with the firmer and narrower leaves glabrous or at most scabrous above and thickened or inclined to inroll at the margins, with mostly crowded spikelets with usually 2–5 florets, and with glumes usually 2–2.5 cm. long. Typical *E. robustus*, as treated by Wiegand, has the backs of the lemmas glabrous or strigose-scabrous, while *E. robustus*, var. *vestitus* Wiegand, l. c. 90, has them villous-hirsute.

[1] Printed with aid of a grant to Rhodora from the National Academy of Sciences.

[2] Wiegand, Rhodora, xx. 81–90 (1918).

In ascribing to the more northeastern plant with broad and thin leaves pilose above the name *Elymus canadensis,* Wiegand referred to the identification of Linnean types made by Hitchcock[1] ten years before the distinctive characters had been clarified by Wiegand. Wiegand says: Hitchcock has "shown that the types of *E. canadensis* and of *E. philadelphicus* [L. Amoen. Acad. iv. 266 (1759)] were essentially the same, and were a plant with very broad leaves and loose nodding spikes. In his description Linnaeus states that the leaves were very broad, and the spikelets six-flowered. Considering these statements and the fact that the plant came from Canada (*Kalm*) there is little doubt whether this or the next species [*E. robustus*] is the real *E. canadensis*."[2]

It is difficult to follow all of Wiegand's statements above quoted. So far as I am able to determine, Linnaeus, in the original description of *E. canadensis* (the only description cited by Wiegand), said nothing about the leaves being "broad" or the "spikelets six-flowered"; in fact, he did not even mention the leaves, but merely contrasted the spikes and spikelets of *E. canadensis* with those of *E. sibiricus.* His description follows:

3. ELYMUS spica flaccido-pendula, spiculis inferioribus ternatis; superioribus binatis. *Gen. nov.* 1094. *canadensis*
Gramen secalinum majus altissimum virginianum. *Moris. hist.* 3. *p.* 180. *s.* 8. *t.* 10. *f.* 2. *Raj. suppl.* 599.
Habitat in Canada. *Kalm.* ♃.
Convenit in plurimis cum E. Sibirico, *a quo tamen differt.* 1. *Spiculis villosis, nec nudis.* 2. Involucris *in aristam exeuntibus longioribus ipsaspicula, demtis aristis; at in sibirica involucrum minus subulatum, sed fere lanceolatum in aristam desinens, quae longe brevior sua spicula.* 3. Spicae *inferne ternae, quum Sibirica semper duas obtineat.* 4. Spiculae, *dum florent, dehiscunt ascapo patulo, in sibirica vero spiculae approximatae sunt scapo.* Variat *haec spicis incurvis & pendulis. Aristae corollinae cum maturescit fructus patenti-reflexae sunt contra ac in Sibirica.*

In his discussion of *E. philadelphicus* L. Amoen. Acad. iv. 266 (1759), Linnaeus made it clear that he conceived *E. canadensis* as having only 4-flowered spikelets. In his diagnosis of *E. philadelphicus* he explicitly characterized his new species "spiculis sexfloris"; he then described it more fully by comparing it with the already published *E. canadensis,* in the comparison referring to the new species as "this" (hac), the older *E. canadensis* as "that" (illa): "*Descr.* Habitus & tota structura simillima *E. canadensi,* sed . . . *Spicu-*

[1] Hitchcock, Contrib. U. S. Nat. Herb. xii. 123 (1908).
[2] Wiegand, l. c. 89 (1918).

lae in hac sexflorae [already given as the diagnostic character of *E. philadelphicus*], in illa quadriflorae."

Although conceiving *Elymus canadensis* L. to be a plant with broad and thin-margined pilose leaves, Wiegand included in its synonymy *E. philadelphicus* L. and *E. glaucifolius* Muhlenberg, which the latter author described "Foliis . . . supra scabris, . . . margine osseis."

From the above contradictions it became evident that the types needed further study in the light of Wiegand's redefinition of specific lines. Accordingly, in the summer of 1930 I took to England a full representation of the group and with the critical coöperation of Mr. Bayard Long compared the selected specimens carefully with the types in the Linnean herbarium of *Elymus canadensis* and of *E. philadelphicus*. To our minds the two Linnean species are essentially identical and in their comparatively firm leaves (pressed out very flat but with involute tips), with glabrous or merely scabrous upper surfaces, and in their "*Spiculis villosis, nec nudis*"[1] they are exactly *E. robustus*, var. *vestitus* Wiegand, RHODORA, xx. 90 (1918).

Wiegand gives the latter plant a range "New Brunswick (introduced) and Maine (introduced) to Delaware, westward to Oregon," etc.; and he seems to have inferred that, since he had seen no indigenous material from Quebec (the Canada of Kalm), *E. canadensis* must be the northeastern plant (known to Wiegand from parts of Quebec) with thinner, broader and pilose leaves. Kalm's Canadian travels were through Lake Champlain, thence to Montreal and then down the St. Lawrence to Quebec and Bay St. Paul, then back to Montreal.[2] It is, therefore, reassuring to find among the specimens identified by Wiegand as his *E. robustus*, var. *vestitus* (i. e. true *E. canadensis*) one from slaty cliffs of Lake Champlain only a few miles from the Canadian border; and that the representation of this group in the Gray Herbarium (augmented since Wiegand saw the material) from the vicinity of Montreal includes three numbers[3] of a plant like that collected by Kalm, true *E. canadensis* (*E. robustus*, var. *vestitus*) but none of the plant with thin and pilose leaves which Wiegand assumed that Kalm had collected. In fact, true glabrous- or scabrous-

[1] From original description of *E. canadensis*. The description of *E. philadelphicus* reads: "Spiculae sunt patulae villosae."

[2] See Kalm, Beschreibung der Reise, iii. 269–626 (1764).

[3] Île de Montréal, *Adrien*, no. 1562; Île Bigras, Environs de Montréal, *Victorin*, no. 28,598; Beauharnois, *Victorin*, no. 24,348. In the autumn of 1931 I noted this plant in abundance on the sands at Sorel.

leaved *E. canadensis* extends northeastward nearly to the limit of Kalm's travels, occurring in Comté de Portneuf (*Adrien*, no. 1897), only a few miles from Quebec. Whether Wiegand's *E. canadensis* (not *E. canadensis* L.) occurs on the shores of Lake Champlain, a region visited by Kalm en route to Montreal, I do not know. In the herbaria before me all specimens from Vermont are from the Connecticut drainage or from streams in central and southern Vermont, while all material of the group from the shores of Lake Champlain (North Hero, Colchester, Burlington, etc.) is of true *E. canadensis* L., not Wiegand; furthermore, all Quebec, Vermont and New York specimens cited by Wiegand of the plant he took to be *E. canadensis* are from outside the Champlain Valley. It is, then, quite clear that *E. canadensis* L. is the plant so identified by Hitchcock but called by Wiegand *E. robustus*, var. *vestitus*. Not only was Kalm's material this plant, but the species is well known in the area of Canada traversed by Kalm, while the species mistaken by Wiegand for *E. canadensis* is rare or unknown in most of the Canadian area visited by Kalm.

Elymus philadelphicus L. is not specifically nor varietally separable from *E. canadensis* L., the type specimens of the two being representatives of slightly differing status of one species.

Elymus glaucifolius Muhl. in Willd. Enum. Hort. Bot. Berol. 131 (1809) was very briefly described, the only points given by Willdenow to separate it from *E. philadelphicus* and *E. canadensis* being "spiculis . . . geminatis" (instead of "spiculis . . . inferioribus ternatis") and "foliis . . . subtus glaucis," the latter point emphasisized in the name and by Willdenow's added comment, "*Folia* latissima subtus saturate glauca"; all three species said by Willdenow to have the spikelets 6-flowered. Muhlenberg himself, in his Descriptio Uberior Graminum, 177 (1817), gave a fuller account of the plant he called *E. glaucifolius* (said by him to have spikelets 2- or 3-flowered) and from his account, "Foliis . . . supra scabris, . . . margine osseis" and from the "Habitat in siccis Pennsylvaniae" it is reasonably clear that *E. glaucifolius*, as he conceived it, was merely the glaucous extreme (such as occurs in most species) of *E. canadensis*. In fact, Muhlenberg himself said of his own *E. glaucifolius*, "Vix ab *E. Canadensi* diversus nisi colore glauco"; and Mr. Long, who has made a search in the Muhlenberg herbarium at the Academy of Natural Sciences of Philadelphia, concludes that *E. glaucifolius*,

at least as retained by Muhlenberg, is only the glaucous phase of *E. canadensis* (*E. robustus*), the form with scabrous or strigose rather than more loosely pubescent lemmas.

From the description by Willdenow it is not clear whether the original *E. glaucifolius* (published in Willd. Enum. Hort. Bot. Berol.) is the extreme with glabrous or merely scabrous lemmas, such as Muhlenberg retained, or whether it has the more villous lemmas of the typical *E. canadensis*. The question was referred to Professor L. Diels of Berlin and through his friendly interest I have from Dr. R. Pilger a detailed account of all the old American material of *Elymus* preserved at Berlin, with very clear photographs and in all cases fragments which fix the identities.

Dr. Pilger writes that there is no material of *Elymus glaucifolius* in the Willdenow Herbarium, but in the general herbarium are three sheets, of which I now have before me clear photographs and characteristic spikelets:

1. (no. 6 of Pilger's letter). From Herb. Nees. Quite like the type of *E. canadensis* L., except that the spikelets are not villous. Leaves stiffish, narrow, scabrous above and with obviously involute tips; spike erect, slightly flexuous; lemmas minutely strigose.

2. (no. 7 of Pilger's letter). Hort. Berol. 1806–12. Ex Herb. Kunth. Leaves firm, rather narrow, strongly infolded, the tips involute, upper surface scabrous; spike denser than in no. 1, arching; spikelets strongly strigose. This specimen being definitely from material in the Berlin Garden, 1806–12, is the most authentic known for *E. glaucifolius*, published in Enum. Hort. Bot. Berol. (1809). It is apparently quite inseparable from the material retained by Muhlenberg and should stand as the TYPE.

3. (no. 8 of Pilger's letter). Herb. Kurt Sprengel. "Amer. sept. Mühlenberg in Hb. C. Spr." Leaves broad and thin, pilose above; spike arching, lax; lemmas villous. This sheet, of which Dr. Pilger sends a portion of leaf as well as spikelets, is exactly what Wiegand took for *E. canadensis*. Although sent to Sprengel by Muhlenberg, it is so clearly not the plant which was in the Berlin Garden, as received from Muhlenberg, that it cannot be taken as in any way fixing the identity of *E. glaucifolius* Muhl. in Willd.

Briefly summarized the essential nomenclature is as follows:

ELYMUS CANADENSIS L. Sp. Pl. i. 83 (1753), TYPE in Linnean Herb., examined August, 1930. *E. philadelphicus* L. Amoen. Acad. iv. 266 (1759), TYPE in Linnean Herb., examined August, 1930. *E. robustus*, var. *vestitus* Wiegand, RHODORA, xx. 90 (1918). *E. canadensis*, var. *philadelphicus* (L.) Farwell, Rep. Mich. Acad. Sci. xxi. 357 (1920). *Terrellia canadensis* (L.) Lunell, Am. Midl. Nat. iv. 228 (1915).

Forma **glaucifolius** (Muhl.), comb. nov. *E. glaucifolius* Muhl. in Willd. Enum. Hort. Bot. Berol. 131 (1809), TYPE at Bot. Gard.

Berlin-Dahlem, authentic fragments in Gray Herb.; Muhl. Gram. 177 (1817). *E. canadensis*, var. *glaucifolius* (Muhl.) Torr. Fl. N. Mid. U. S. i. 137 (1824). *E. robustus* Scribn. & Sm. Bull. Div. Agrost. 4: 37 (1897), duplicate TYPE in Gray Herb. *E. canadensis*, var. *robustus* (Scribn. & Sm.) Mackenz. & Bush in Mackenz. Man. Fl. Jackson Co. Mo. 38 (1902). *E. glaucifolius*, var. *robustus* (Scribn. & Sm.) Bush, Am. Midl. Nat. x. 86 (1926). *E. philadelphicus*, var. *robustus* (Scribn. & Sm.) Farwell, Am. Midl. Nat. x. 314 (1927). *Terrellia canadensis glaucifolia* (Muhl.) Lunell, Am. Midl. Nat. iv. 228 (1915).

The northeastern plant differentiated by Wiegand but erroneously identified by him as *E. canadensis* is a well marked species. In view of his being the first to characterize the plant it is a pleasure to call the species

E. **Wiegandii**, sp. nov., 1–2 m. altus, plus minusve glaucus; foliis caulinis 10–18, laminis tenuibus plerumque 2–3.5 dm. longis 1.3–2.4 cm. latis (40–) 60–100-nerviis, supra plerumque villosis; spicis laxis flexuosis plerumque nutantibus 1–3.5 dm. longis rachi vix obtecto, segmentis racheos mediis 5–9 mm. longis; spiculis laxe adscendentibus 1.5–2.5 cm. longis 3–7-floris; glumis lineari-aristiformibus 1.5–3 cm. longis; lemmatibus villoso-hirsutis 3.5–4.5 cm. longis, aristis deinde curvatis; palea 9–15 mm. longa.—*E. canadensis* Wiegand, RHODORA, xx. 87 (1918), as to plant, not as to synonymy; not L. Sp. Pl. i. 83 (1753). *E. philadelphicus* var. *hirsutus* Farwell, Am. Midl. Nat. x. 214 (1927), not *E. hirsutus* Schreb. (1817) nor Presl (1825).—Alluvial soil, Gaspé County, Quebec to Lake St. John, west to central New York, south in the valleys of the larger rivers to southern New Brunswick, New England and eastern Pennsylvania. The following may stand as TYPE: low gravelly thicket by St. John River, St. Francis, Maine, August 5, 1893, *Fernald*, no. 197, in Gray Herb. (distributed as *E. canadensis*, var. *glaucifolius*).

E. WIEGANDII, forma **calvescens**, a forma typica recedit lemmatibus glabris vel scabro-hirtellis nec villoso-hirsutis.—Occasional through the range of the species. TYPE: river-intervale, Dead River, Maine, August 13, 1896, *Fernald & Strong* (Herb. N. E. Bot. Club).

Elymus Wiegandii is at once distinguished from *E. canadensis* by its very lax inflorescence, with shorter glumes, and its usually longer palea. Its foliage is quite different, thin, broad and flat, commonly with definite villosity or pilosity along the nerves on the upper surface. In *E. canadensis* the stiffer and narrower leaves are glabrous or only scabrous above, firm at the margin and strongly involute in drying. In *E. Wiegandii* the fertile culms have 10–18 leaves, these (when well developed) with 60–100 nerves (only in very small individuals with as

few as 40); but the stiff cauline leaves of *E. canadensis* are usually only 6–9 (even down to 4) in number, mostly 20–40 (in very large specimens rarely –70)-nerved. The spikelets of *E. Wiegandii* of river-alluvium are mostly ripe and dropped in western and southern New England at dates varying with different seasons from August 10 to September 5. In *E. canadensis* of dry upland soil in the same area the crowded inflorescence is usually quite intact through September.

As treated in recent American works, *Elymus striatus* Willd. Sp. Pl. i. 470 (1797) is defined as "More or less pubescent . . . leaves pubescent on the upper surface; . . . *glumes awl-shaped, hispid or hirsute, 2 or 3 times the length of the hirsute floret*";[1] or, again, with "leaves . . . villous on the upper surface; sheaths . . . villous: . . . glumes . . . terete . . . villous: lemmas villous."[2] The original description by Willdenow did not note any pubescence of leaf-blade and sheath, characters so conspicuous in the plant now passing as *E. striatus* as to be much emphasized. Willdenow placed his *E. striatus* between *E. virginicus* L. and *E. europaeus* L., the latter a species resembling *E. virginicus* but with narrower and less strongly ribbed glumes. Willdenow apparently was not personally familiar with the original *E. virginicus*, merely quoting or citing earlier accounts by others; and he named his new species *E. striatus* because it had the glumes narrower and more prominently striate than in his conception of *E. virginicus* (involucris *angustioribus elevato-striatis*). In his second account[3] of *E. striatus*, in 1809, Willdenow gave a fuller description: "spiculis bifloris hispidis . . . calycibus linearibus nervosis . . . foliis planis, vaginisque glabris." This account, with spikelets merely hispid, glumes linear, and leaf-blades and sheaths glabrous, is so contrary to the current American conception of *E. striatus* that it has seemed important to learn exactly what Willdenow had before him.

Again, just as in the case of *Elymus glaucifolius*, the notes, photographs and fragments sent by Dr. Pilger from the sheets preserved at Berlin lead to the solution of the dilemma. The only specimen definitely marked by Willdenow as *E. striatus* bears in Willdenow's hand a small label "308. *Elymus striatus* (W.) (*Mühlenberg mis* [*it*])." This, as Schlechtendal had already noted, is a characteristic

[1] Hitchc. in Gray Man. ed. 7: 169 (1908).
[2] Wieg. Rhodora, xx. 86, 87 (1918).
[3] Willd. Enum. Hort. Bot. Berol. 131 (1809).

small piece of *E. virginicus:* "Dieses Examplar ist von Schlechtendal aus dem Umschlag mit *E. striatus* im Herb. Willdenow entfernt worden und zu *E. virginicus* gelegt worden" (Pilger *in lit.*). The spikelets of this plant are essentially glabrous except for the hispid awns; and in view of the facts that in all other points it matches Willdenow's accounts and that it is the plant which he had himself labeled and retained as *E. striatus* it must stand as the TYPE of that species.

Two other sheets preserved at Berlin in the cover of *E. striatus* (not in that of *E. virginicus*, where the type of *E. striatus* was placed by Schlechtendal and, consequently, overlooked by later visitors to Berlin) are significant. One is a characteristic sheet of *E. arkansanus* Scribn. & Ball, in the Willdenow Herbarium, without data; the other is a sheet of specimens from Kunth of a plant cultivated as *E. striatus* in the Berlin Garden from 1806–12. This is also thoroughly characteristic *E. arkansanus*, with spikelets essentially glabrous, glumes acicular, and the leaves positively pilose on the upper surface. Having been cultivated at Berlin from 1806–12 and having glabrous spikelets and pilose leaf-blades, this sheet from Kunth has no connection with the species described by Willdenow in 1797 (and again in 1809) as having hispid spikelets, linear glumes and glabrous leaves. It has, however, doubtless been erroneously taken for the type (since the real type of *E. striatus* had been rightly placed with *E. virginicus*); but it lacks the dense pilosity so characteristic of the plant usually passing as *E. striatus*.

Since, by resting our interpretation of the species upon the type, the plant we have been calling *Elymus striatus* can no longer retain that name, it is fortunate that another of the names based upon Muhlenberg material can be taken up for it. *E. villosus* Muhl. in Willd. Enum. Hort. Bot. Berol. 131 (1809), "spiculis . . . villosis, calycibus aristatis spiculas superantibus," is exactly the plant with villous spikelets and strongly pilose or villous leaf-blades and -sheaths. The photograph of the original sheet in the Willdenow Herbarium, for which I am, further, greatly indebted to Professor Diels and Dr. Pilger, shows it labeled in Willdenow's hand: "33. *Elymus villosus* (W.) (*Mühlenberg mis* [*it*])." The photograph is unmistakable and the villous linear-acicular glumes and villous lemmas are perfectly characteristic. A second sheet of this plant contains specimens from the Berlin Garden; one group from Herb.

Kunth, the other (a single specimen) from Link. The leaf-blades and sheaths of these, as shown by the fragments supplied by Dr. Pilger, are strongly pilose, the acicular glumes and the lemmas copiously villous. *E. striatus* of recent American authors is, then, E. VILLOSUS Muhl., of which *E. arkansanus* Scribn. & Ball is only a form with the lemmas glabrous or merely minutely strigose.

Although the latter (*E. arkansanus*) has been assigned a more southern range, it actually reaches the northeastern limit of the species, while typical *E. villosus* grows as far west and south; there is no clear geographic segregation of the two and they are better treated as minor forms, quite parallel with those found in other species of the genus.

In the first six editions of the Manual, Asa Gray (or his successors), interpreting *Elymus striatus* from the material under that name in the cover of *E. striatus* at Berlin (the type having been transferred to the cover of *E. virginicus*), treated *E. villosus* as a variety of it with more hairy spikelets: "Var. VILLOSUS (E. villosus, *Muhl.!*) has a somewhat stouter spike and very hairy glumes."[1] Recent authors, however, have erroneously reversed the interpretation, treating *E. villosus* as true *E. striatus* and keeping the extreme of it with merely hirtellous to glabrous spikelets apart, either as a species, *E. arkansanus* Scribn. & Ball, Bull. Div. Agrost. 24: 45 (1901), or as a variety of the more hairy plant, *E. striatus*, var. *arkansanus* (Scribn. & Ball) Hitchc. RHODORA, viii. 212 (1906). But, as the preceding discussion indicates, the type of *E. striatus* is a small *E. virginicus*. The more slender plant with linear-acicular glumes should, therefore, be called *E. villosus* Muhl. Its essential bibliography follows.

ELYMUS VILLOSUS Muhl. in Willd. Enum. Hort. Bot. Berol. 131 (1809); Link, Hort. Bot. Berol. i. 16 (1827), ii. 178 (1833). *E. striatus*, var. *villosus* (Muhl.) Gray, Man. 603 (1848). *E. striatus* Hitchc. in Gray, Man. ed. 7: 169 (1908); Wiegand, RHODORA, xx. 86 (1918); not Willd. (1797).

Forma **arkansanus** (Scribn. & Ball), comb. nov. *E. arkansanus* Scribn. & Ball, U. S. Dept. Agric. Div. Agrost. Bull. no. 24: 45 (1901). *E. striatus*, var. *arkansanus* (Scribn. & Ball.) Hitchc. RHODORA, viii. 212 (1906); Wiegand, RHODORA, xx. 87 (1918).

Although Scribner & Ball cited this extreme only from Arkansas, Missouri and Iowa, Hitchcock gave its northeastern limit as Maryland, and Wiegand cited nothing from northeast of Virginia, forma *arkan-*

[1] Gray, Man. 603 (1848).

sanus actually reaches the extreme northeastern limit of the species (Grape Swamp, Plum Island, Essex Co., Massachusetts, August 29, 1896, *A. A. Eaton;* river-banks, Brattleboro, Vermont, August 2, 1898, *B. L. Robinson*, no. 85). Typical *E. villosus* is before me from Iowa, Missouri and Oklahoma. The two extremes are best treated as forms rather than as varieties or as separate species.

Elymus virginicus L. and plants clearly merging into it have recently been variously treated: as a series of species, *E. virginicus* L., *E. intermedius* Scribn. & Sm., *E. hirsutiglumis* Scribn., *E. halophilus* Bickn., *E. australis* Scribn. & Ball *E. jejunus* (Ramaley) Rydb., *E. curvatus* Piper and *E. glabriflorus* (Vasey) Scribner & Ball; or as two species, *E. virginicus* and *E. australis*, each with so-called varieties, with glabrous and with pubescent spikelets.

When they published *E. glabriflorus*, based on *E. canadensis*, var. *glabriflorus* Vasey, Scribner & Ball recognized its close similarity to *E. australis*, saying, "This species is more closely allied to *E. australis*, of which it is a glabrous-flowered counterpart, than to *E. canadensis*, from which it is distinguished," etc., etc.[1] No one has subsequently placed *E. glabriflorus* with *E. canadensis;* but had the authors of the former clearly pointed out morphological characters to separate it from *E. australis* we should all be grateful. After several days of intensive study of the group I am quite unable to find any difference between the two except the single unimportant one originally pointed out, *E. glabriflorus* being merely the "glabrous-flowered counterpart" of *E. australis*. The two have the same range and they are quite parallel with the cases discussed in previous paragraphs: *E. canadensis* and forma *glaucifolius*, *E. Wiegandii* and forma *calvescens*, *E. villosus* and forma *arkansanus*, in which each species exhibits more or less throughout its range a tendency to have either glabrous or merely hirtellous spikelets and, likewise, a tendency with more pilose or villous spikelets. Such tendencies, without geographic segregation, are much more rationally treated as forms than as varieties.

E. hirsutiglumis Scribn. was reduced by Hitchcock, Rhodora, x. 65 (1908), to varietal status, as *E. virginicus*, var. *hirsutiglumis*, differing only in having hirsute spikelets, its range included within that of typical *E. virginicus*. Others have been unable to point out any morphological differences between the two and I find myself unable to maintain them as more than formally different—unless one examines

[1] Scribn. & Ball, U. S. Dept. Agric. Div. Agrost. Bull. no. 24: 50 (1901).

the indument of the spikelets with a lens no differences are observable in the plants.

E. glabriflorus was published as "a glabrous-flowered counterpart" of *E. australis*. It is, therefore, significant to note in the original discussion, that *E. australis* "may be separated from *E. hirsutiglumis* Scribn., its nearest ally, by its more robust spikes and longer glumes and awns"; but when an attempt is made to state this difference of size we get the key-characters worked out by Wiegand:

c. Glumes 1–2.7 cm. long: lemmas 1–3 cm. long.............*E. virginicus.*
c. Glumes 2.7–4 cm. long: lemmas (2.8–) 3.5–4.5 cm. long: spikes exserted....................................*E. australis.*[1]

In other words, the measurements overlap, and the ranges certainly do, while certain exceptional collections northward of *E. virginicus* "have unusually large and coarse spikes." The strong tendency of typical *E. virginicus*, it is true, is to have the spikes hardly at all to barely exserted and for the essentially southern *E. australis* and var. *glabriflorus* (Vasey) Wiegand to have the spike clearly exserted; but enough interchanges of this tendency occur to destroy its significance as specific: *E. virginicus*, var. *jejunus* (Ramaley) Bush has the spikes exserted and *E. virginicus* var. *halophilus* (Bicknell) Wiegand has "more uniformly exserted . . . spikes." In the latter the spikelets are commonly glabrous, but in one colony from Yarmouth County, Nova Scotia, they are so hirsute that the involute-leaved and grayish plant of the sea-beach was at first placed (for want of a better place to put it) with the much coarser, flat-leaved and green var. *hirsutiglumis*.

As I find myself viewing the matter, it seems to me that, without any morphological characters but with differences only in size, texture and indument, the group including *E. virginicus, E. hirsutiglumis, E. glabriflorus, E. australis*, etc. is much better treated as one polymorphous species, as follows:

a. Glumes 1–2.7 cm. long: lemmas 1–3 cm. long....*b.*
  b. Glumes and lemmas awned....*c.*
    c. Base of spike (0.4–2 dm. long) included in or barely exserted from the inflated upper sheath: glumes mostly 1.5–2 mm. wide: leaves flat, 5–13 mm. broad....*d.*
      d. Lemmas and glumes glabrous or merely scabrous-ciliate....................................Var. *typicus.*
      d. Lemmas and glumes villous-hirsute........Forma *hirsutiglumis.*
    c. Spike 3–12 cm. long, well exserted (mostly 3–15 cm.) above the hardly inflated sheath: glumes mostly 0.8–1.6 mm. wide: leaves flat or involute....*e.*

[1] Wiegand, Rhodora, xx. 82 (1918).

e. Leaves of flowering culm 6–8, mostly flat, up to 13 mm. wide: spikes full-green: indurated bases of glumes green or stramineous .... Var. *jejunus*.
e. Leaves of flowering culm 4–6, firm, often involute, 3–8 mm. broad: spikes whitish-green: indurated bases of glumes white or very pale.
Lemmas and glumes glabrous or merely ciliate-scabrous .... Var. *halophilus*.
Lemmas and glumes hirsute... Var. *halophilus*, forma *lasiolepis*.
b. Glumes and lemmas muticous or merely subulate-tipped. . Var. *submuticus*.
a. Glumes 2.7–4 cm. long: lemmas mostly 3.5–4.5 cm. long: spikes exserted, 0.4–2 dm. long.
Lemmas and glumes glabrous or merely scabrous-ciliate. Var. *glabriflorus*.
Lemmas and glumes hirsute.... Var. *glabriflorus*, forma *australis*.

E. virginicus L., var. **typicus**. *E. virginicus* L. Sp. Pl. 84 (1753); Wiegand, Rhodora, xx. 83 (1918). *E. striatus* Willd. Sp. Pl. i. 470 (1797), not most recent authors.

Forma **hirsutiglumis** (Scribn.), comb, nov. *E. intermedius* Scribn. & Sm. U. S. Dept. Agric. Div. Agrost. Bull. no. 4: 38 (1891), not Bieb. (1808). *E. hirsutiglumis* Scribn. U. S. Dept. Agric. Div. Agrost. Bull. no. 11: 58 (1898). *E. virginicus*, var. *hirsutiglumis* (Scribn.) Hitchc. Rhodora, x. 65 (1908).

Var. jejunus (Ramaley) Bush, Am. Midl. Nat. x. 65 (1926). *E. virginicus*, forma *jejunus* Ramaley, Bull. Geol. Nat. Hist. Surv. Minn. ix. 114 (1894). *E. jejunus* (Ramaley) Rydb. Bull. Torr. Bot. Cl. xxxvi. 539 (1909).

Var. halophilus (Bickn.) Wiegand, Rhodora, xx. 83 (1918). *E. halophilus* Bickn. Bull. Torr. Bot. Cl. xxxv. 201 (1908).

Var. halophilus, f. **lasiolepis,** forma nov., lemmatibus pilosis.—Nova Scotia: crest of cobbly barrier beach, Sand Beach, September 7, 1920, *Fernald, Long & Linder*, no. 20,113 (type in Gray Herb.), distributed as *E. virginicus*, var. *hirsutiglumis*.

Var. submuticus Hook. Fl. Bor.-Am. ii. 255 (1840). *E. curvatus* Piper, Bull. Torr. Bot. Cl. xxx. 233 (1903).

Var. glabriflorus (Vasey) Bush, Am. Midl. Nat. x. 62 (1926). *E. canadensis*, var. *glabriflorus* Vasey, Contrib. U. S. Nat. Herb. ii. 550 (1894). *E. glabriflorus* (Vasey) Scribn. & Ball, U. S. Dept. Agric. Div. Agrost. Bull. no. 24: 49 (1901). *E. australis*, var. *glabriflorus* (Vasey) Wiegand, Rhodora, xx. 84 (1918).

Var. glabriflorus, f. **australis** (Scribn. & Ball), comb. nov. *E. australis* Scribn. & Ball, U. S. Dept. Agric. Div. Agrost. Bull. no. 24: 46 (1901).

NOTES FROM THE HERBARIUM OF THE UNIVERSITY OF WISCONSIN—IX[1]

Norman C. Fassett

One of the most valuable recent works on the flora of the Middle West is, without any doubt, the *Annotated Flora of the Chicago Area*, by Dr. H. S. Pepoon. It is not in a spirit of petty fault-finding, for it is easy to pick flaws once the work is done, but rather in recognition of its excellence and in an effort to render it more useful to botanists in general that the following facts are recorded.

One of the names most frequently appearing in this work is that of Professor Levi M. Umbach; and well it may be, for the late Professor Umbach collected, between the years 1895 and 1914, more than 14,000 numbers, most of them in the Chicago area. His herbarium is now incorporated with that of the University of Wisconsin.

Of the 1908 species and varieties recorded by Pepoon many seem to have been included entirely on the authority of Umbach, and in the majority of these cases specimens can be found which obviously form the bases of these reports. For example, *Oxybaphus hirsutus* is recorded as follows: "C. B. & Q. Ry. near Lisle, occasional specimens. (Umbach)." In the herbarium are found two specimens with the following data, respectively: "On ballast, Lisle, Ill., July 14, 1900, *L. M. Umbach*," and "Along R. R., Lisle, Ills., Aug. 12, 1907, *L. M. Umbach*." Again, *Vernonia noveboracensis* is listed with the following comment: "Low ground near streams, not common. Romeo. Clarke. (Umbach). It is decidedly doubtful about the occurrence of this plant in our area, yet Prof. Umbach was a very careful and skilled botanist." There is no material so named from Romeo and Clarke; still, since there are specimens labelled *V. noveboracensis* from Palos Park and Naperville, Illinois, from Millers, Indiana, and from Magician Lake, Michigan, none of which are *V. noveboracensis*, we may conclude that the report is erroneous.[2] On the other hand, there are many of these reports for which no substantiating specimen can be found among Umbach's collections.

Of the 82 species and varieties included entirely on the authority of Umbach, the following must be reconsidered in the light of incorrectly determined specimens.[3]

[1] Printed with aid of a grant to Rhodora from the National Academy of Sciences.

[2] Cf. Gleason, Torreya xxviii. 9 (1928).

[3] Since the Flora is based primarily upon ed. 7 of Gray's Manual, such changes as would result from altered concepts resulting from systematic or nomenclatorial research since 1908 are not considered here.

Aspidium simulatum Davenp. "Tolleston, in boggy woods, 1909. (Umbach)." A specimen labelled, "*Aspidium simulatum* Davenp. Swamp, Tolleston, Ind., no. 5013, Sept. 18, 1909" is *A. Thelypteris* of Gray's Manual, ed. 7 (*Thelypteris palustris* (Salisb.) Schott, var. *pubescens* (Lawson) Fernald) as is evidenced by the forked veins of the segments of the sterile fronds, and by the long-ciliate and somewhat glandular indusia.[1]

Aristida intermedia Scribn. & Ball. "Miller and Dune Park. (Umbach) Not common." A specimen from Miller, Oct. 1, 1898, is correctly determined as *A. intermedia;* one from Dune Park, no. 1503, labelled *A. intermedia,* is *A. purpurascens* Poir., and was so marked by C. C. Deam in 1928.

Bromus hordeaceus L. "Railroads at Clarke and Miller, Ind. (Umbach)." Specimens, so labelled, from moist sands, Clarke, Ind., June 17, 1899, and from swales, Miller, June 24, 1898, have both been marked *B. commutatus* Schrad., by C. C. Deam.

Agrimonia rostellata Wallr. "Alluvial soil, Naperville, 1912. (Umbach)." Umbach's no. 6281, ravine, Naperville, Ill., Sept 6, 1912, so identified, is *A. mollis* (T. & G.) Britton. The stem and leaves are soft-pubescent, and the hypanthium is deeply furrowed, with hooks equalling the calyx-lobes in length.

Oxalis filipes Small. "Calumet Heights, '06. Porter, '12. Wheatland, '16. (Umbach)." A sheet labelled, "*Oxalis filipes* Small, along R. R., Calumet Heights, Ind., no. 957, May 30, 1906" is *O. stricta* L. There is no specimen called *O. filipes* from Porter. One labelled, "*Oxalis filipes* Small, roadside, Wheatland, Ill., no. 6148, Aug. 26, 1912" is *O. europaea* Jord., or according to Gray's Manual, ed. 7, *O. corniculata.*

Callitriche deflexa Austini (Engelm.) Heg. "Wet soil of Skokie Marsh. (Umbach)." A specimen named *Callitriche Austini* Engelm., from Skokie, Highland Park, Ill., June 9, 1900, is *C. heterophylla* Pursh. The upper leaves are obovate and have minute scales, while the lower, apparently submerged, leaves are very narrow; the wingless fruit is clearly that of *C. heterophylla.*

Nyssa sylvatica biflora (Walt.) Sarg. "Moist margins of swamps. Dune Park, 1912. Rare. (Umbach)." Two sheets of apparently typical *N. sylvatica* collected in Dune Park in 1900 and 1912 are determined correctly. A sheet from Port Chester named *N. sylvatica* var. *biflora,* and one from Miller labelled *N. aquatica* are, as far as the present writer can see, ordinary *N. sylvatica.*

Teucrium canadense littorale (Bick.) Fernald. "Naperville, 1912. (Umbach)." Umbach's no. 5664, from Naperville, Ill., July 15, 1912, identified as this, is *T. occidentale* Gray, as is evidenced by the villous pubescense and long-stipitate glands on the calyx.

Stachys cordata Riddell. "Romeo, 1907, in moist soil, rare. (Umbach)." A specimen labelled, "*Stachys cordata* Riddell, banks,

[1] See Rhodora xxxi. 29 (1929).

Romeo, Ills., no. 1897, Aug. 7, 1907" is not that species, for the sides of the stem are perfectly glabrous; it is rather *S. tenuifolia* Willd., var. *aspera* (Michx.) Fernald.

PHYSALIS BARBADENSIS Jacq. "Along the Alton Ry. at Brighton Park, '96 and '98. (Umbach)." Two specimens, one from dumping ground, Brighton Park, Chicago, Ill., Aug. 17, 1897, and the other from waste ground, Chicago, Ill., Aug. 3, 1897, have each been marked *P. angulata*, then *P. barbadensis*. Both have short deltoid calyx-lobes quite unlike those of the latter species. The peduncles are 3–5 cm. long in fruit; the plants may be *P. pendula* Rydb.

PHYSALIS ALKA-KENGI L. "Persisting in gardens in Naperville; also in a few fields. (Umbach)." There are two collections; one is from gardens, Naperville, Aug. 20, 1898, and the other is cultivated, Naperville, Sept. 4, 1895. Only the former shows underground parts; there is a slender tap-root with no rootstocks whatever. The plants are perhaps *P. pruinosa* L., for the leaves are thick, heavy-pubescent, and coarsely dentate to the cordate base.

VERNONIA NOVEBORACENSIS Willd. "Romeo. Clarke. (Umbach)." Three sheets bearing this name are from Palos Park, Ill., Miller, Ind., and Magician Lake, Mich., while one from Naperville is named *V. noveboracensis* var. *latifolia*. None have filiform tips on the involucral bracts; they are *V. missurica* Raf.[1]

VERNONIA GLAUCA (L.) Willd. "Low ground, Palos Park and Naperville. (Umbach)." There is no material so labelled from Naperville; two sheets from Palos Park which bear this name are *V. missurica.*

The genus *Vernonia* as represented in this region by the Umbach collections consists of *V. missurica, V. fasciculata,* and *V. Baldwini;* the last-named, not listed by Pepoon, is represented by a single collection at Beach, Ill., Sept. 2, 1908.

HIERACIUM MARIANUM Willd. "Open dry places near Gary and at Port Chester. (Umbach)." There are eight collections by Umbach identified as this species. A number from Gary, Dune Park, Clarke, and Miller, Ind., and three sheets from Magician Lake, Mich., have the elongated inflorescence and stellate pubescence of *H. Gronovii* L. One sheet from Port Chester, Ind., called *H. marianum,* is *H. scabrum* Michx.

There are 181 records based in part upon specimens of Umbach, and in part upon some other authority. Some of these may be open to question, being, as far as the Umbach records go, based upon misdeterminations.

PANICUM BOREALE Nash. "Moist open swales, southeast of Miller, along the B. & O. Ry. Abundant locally. (Pepoon, Umbach)." Also on the authority of Hill. The plant so labelled, from swales,

[1] Including *V. illinoensis* Gleason; see N. Am. Flora xxxiii. pt. 1: 91 (1922).

Miller, Ind., June 24, 1898, has been determined as *P. spretum* Schult., by Hitchcock and Chase. However, *P. boreale* is in the region (see Deam, Grasses of Indiana, p. 266).

Rynchospora corniculata (Lam.) Gray. "Marsh borders northeast of Dune Park, and eastward. (Umbach, Pepoon)." Three sheets, collected Sept. 2, 1898, July 24, 1906, and Sept. 4, 1906, at Dune Park, and named *R. corniculata*, have bristles exceeding the achene, and are *R. macrostachya* Torr.

Scleria pauciflora Muhl. "Miller. (Umbach)." Also on the authority of Hill. Two collections so identified from Miller, and three from Dune Park, have the pubescence which places them with *S. pauciflora* var. *caroliniana* (Willd.) Wood.

Talinum teretifolium Pursh. "Sandy hills, Miller and vicinity, rare. (Umbach, Pepoon)." The material is *T. rugospermum* Holzinger, which species is also reported on the authority of Umbach. *T. teretifolium* does not occur in the region.[1]

Agrimonia gryposepala Wallr. "Thickets, Wheatland, 1909. (Umbach) Clarke, Ind. More common southeast." Umbach's no. 4030, from Wheatland, Ill., determined as this, is *A. mollis* (T. & G.) Britton. True *A. gryposepala* is represented, however, by collections from Beach, Downers Grove, Warrenville, Sag, Orland and Palos Park, Ill., and from Clarke, Ind.

Vitis cinerea Engelm. "In a tamarack marsh two miles east of Miller, Ind. Only a few vines. (Umbach, Pepoon)." A specimen from Miller, given this name, is *V. labrusca* L.

Gerardia pedicularia L. This is listed as a common plant, while the variety *ambigens* Fernald is recorded only from Clarke, on the authority of Umbach. Actually, all the Umbach collections from the area, mostly determined as typical *G. pedicularia*, are the variety. Peattie, in the Flora of the Indiana Dunes, lists only the variety.

Gerardia laevigata Raf. "Dune Park. (Umbach) 1906. South Chicago. (Babcock)." The plant labelled, "*Dasystoma laevigata* Raf., woods, Dune Park, Ind., no. 1437, Sept. 4, 1906" is the plant called *G. virginica* (L.) BSP. in Gray's Manual, ed. 7.

Vernonia altissima Nutt. "Moist thickets and slough borders, Dune Park. (Hill) Porter, Ind., 1912 (Umbach)." A sheet so determined, from fence rows, Porter, Ind., no. 6130, Aug. 20, 1912, is *V. missurica* Raf., as are others from Mt. Tom and Syracuse, Ind., also called *V. altissima*. A sheet so identified, from Lisle, Ill., is *V. fasciculata* Michx. *V. altissima* is reported from the area by Peattie, Flora of the Indiana Dunes, on the authority of Judge J. R. Churchill.

Solidago arguta Ait. "Pine and Miller, Ind., very rare. Dune Park and Clarke. (Umbach) This is a questionable station for the species." Specimens so named from Dune Park and Clarke have the leaves very scabrous above, and are *S. patula* Muhl.

Aster patens Ait. "Big woods at Evanston. (Raddin). War-

[1] See Rhodora xxx. 205–206 (1928).

renville. (Umbach)." A specimen so named, from Warrenville, is *A. laevis* L.

LACTUCA FLORIDANA (L.) Gaertn. "Low rich thickets, occasional. Common southeast. Beach near Waukegan. (Umbach)." There is no sheet so named and labelled Waukegan; one from Beach, Ill. (a station near Waukegan, apparently the location in question) is *L. ludoviciana* (Walt.) Riddell. Specimens labelled *L. floridana*, from Naperville, Sag, and Riverside, Ill., are all *L. villosa* Jacq.

MADISON, WISCONSIN.

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. FERNALD

(*Continued from page 185*)

NARDUS STRICTA L. The Newfoundland record has rested upon *Robinson & Schrenk*, no. 209, from rocky banks of Rennie's River, St. John's. Mrs. Ayre now sends material from the Newtown Marsh near St. John's, as also from Quidi Vidi and banks of Waterford River —all in the same general area; also from the marshes of Beaver Pond, Salmonier.

*AVENA FATUA L. Apparently becoming a rather general weed in Newfoundland, as elsewhere in eastern America. Mrs. Ayre gets it in old fields and waste places on the Avalon Peninsula. Our collection from the West Coast is from BONNE BAY: bushy margin of cultivated clearing, Middle Brook, *Fernald, Long & Fogg*. no. 1287.

SPHENOPHOLIS PALLENS (Spreng.) Scribn. The northernmost station yet known in on BONNE BAY: limestone cliffs and talus, Tucker's Head, *Fernald, Long & Fogg*, no. 1295.

DESCHAMPSIA ATROPURPUREA (Wahlenb.) Scheele. Additional station on the HIGHLANDS OF ST. JOHN: peat on quartzite slopes, head of Deep Gulch, Doctor Hill, *Fernald, Long & Fogg*, no. 1297.

*AGROSTIS ROSSAE Vasey. BONNE BAY: rocky soil, August 1, 1930, *K. P. Jansson*.

This is the first station in eastern America for a characteristic little species (with very short-tufted leaves and dense linear-cylindric panicles, with spikelets about 2 mm. long) of the cordilleran region from Wyoming and Colorado to British Columbia and California. Its discovery at Bonne Bay is a clear indication of the need of further work there. Our party of 1929 did not see it; neither did Mr. Jansson find many of the localized species seen by us. He made his center at Lomond and in his brief stay reached areas we did not visit

THE VARIATIONS OF AGROSTIS BOREALIS.—The species generally known as *Agrostis borealis* Hartm. presents in eastern North America

three strikingly different variations, which by some botanists have been considered distinct species, by others as of not even formal value. In Newfoundland all three occur and in their best development they are so distinct that they have been heretofore regarded by me as three species; but with the accumulation of much material it becomes apparent that their characters are intergradient and that they have no fundamental morphological distinctions. As geographic varieties, however, they are tolerably definite; and their distinguishing characters are enumerated below.

a. Lemma awned: branches of mature panicle spreading-ascending.
  Spikelets (glumes) 2–3 (av. 2.6) mm. long: culms 0.4–4.5 dm. high: leaf-blades 0.2–2 mm. broad, flat or more commonly involute: panicle 1.5–14 cm. long . . . . Var. *typica.*
  Spikelets (glumes) 2.8–4 (av. 3.3) mm. long: culms 1.5–7.5 dm. high: leaf-blades 1–4 mm. broad, flat: panicle 3–17 cm. long . . . . Var. *americana.*
a. Lemma awnless: branches of mature panicle strongly ascending: spikelets 2.8–4.6 (av. 3.6) mm. long: culms 0.2–3.5 dm. high: leaf-blades 0.2–2 mm. broad, flat or involute: panicle 1–10 cm. long . . . . Var. *paludosa.*

A. borealis Hartm., var. **typica.** *A. borealis* Hartm. Skand. Fl. ed. 3: 17 (1838); Hitchcock, N. Am. Sp. Agrostis—U. S. Dept. Agric. Bur. Pl. Ind. Bull. no. 68: 52 (1905), in large part (1905). *A. Mertensii* Trin. Mém. Acad. St. Pétersb. sér. 6, vi² 331 (1841). *A. canina*, var. *alpina* Oakes, Cat. Pl. Vermont, 32 (1842). *A. canina*, var. ? *tenella* Torr. Fl. N. Y. ii. 443 (1843). *A. concinna* Tuckerm. Hovey's Mag. Hort. ix. 143 (1843) and Am. Journ. Sci. xlv. 42 (1843). *A. Pickeringii, β. rupicola* Tuckerman, Am. Journ. Sci. l. c. (1843). *Trichodium concinnum* (Tuckerm.) Wood, Cl.-Bk. ed. 2: 600 (1847).—Northern Eurasia; northern North America from Greenland and Labrador to the higher mountains of Maine, New Hampshire, northern Vermont and northern New York; Alaska and British Columbia. The following, selected from a large representation, are typical. Labrador: Nachvak, *Sornborger*, no. 244; Hopedale, *Sornborger*, no. 225; Anatolak, *Sewall*, nos. 425, 440, 442, 444; Nain, *Sewall*, no. 92, *Bishop*, no. 59. Newfoundland: Little Quirpon, *Fernald & Long*, no. 27,474; summit, Bard Harbor Hill, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 27,473; Deer Pond Brook, Highlands of St. John, *Fernald & Long*, no. 27,475; dry meadow on tableland of Doctor Hill, *Fernald, Long & Fogg*, no. 1309; serpentine tableland, Bonne Bay, *Fernald & Wiegand*, no. 2526, *Fernald, Long & Fogg*, no. 1312; limestone cliffs near Stanleyville, *Fernald, Long & Fogg*, no. 1311; Lark Mountain, *Fernald, Long & Fogg*, no. 86; Blow-me-down Mts., *Eames & Godfrey*, nos. 5829, 5831; Harry's River, *Fernald & Wiegand*, no. 2524. Quebec: Blanc Sablon ("Labrador"), *Fernald & Wiegand*, no. 2522; Tabletop Mts., *Fernald & Collins*, no. 389; Mt. Dunraven,

Tabletop Mts., *Fernald, Dodge & Smith*, no. 25,483; Coulée des Fourches, Mt. Albert, *Victorin, Rolland, Brunel & Rousseau*, no. 17,814; Little Cascapedia River, *Collins, Fernald & Pease*, no. 4931; Le Bicquet, Co. Rimouski, *Rousseau*, no. 30,039. MAINE: Mt. Katahdin, *A. Young et al.;* Mt. Bigelow, *Fernald & Strong*, no. 487. NEW HAMPSHIRE: White Mts., "In alpibus," as *A. concinna, Tuckerman* (TYPE or duplicate type of *A. concinna*); alpine region, White Mts., *Oakes*, as *A. canina*, var. *alpina* Oakes; and many subsequent collections from the mountains of Coös and Grafton Cos., including the following somewhat widely distributed numbered ones: Mt. Washington, *Robinson*, no. 981; *Hitchcock*, Amer. Gr. Nat. Herb. no. 443; Mt. Lafayette, *Fernald* in Pl. Exsicc. Gray. no. 117. VERMONT: Mt. Mansfield, *Pringle, Faxon et al.* NEW YORK: Whiteface Mt., *Hitchcock*, Amer. Gr. Nat. Herb. no. 442; Mt. McIntyre, *House*, no. 9493. ALASKA: Nome, *Hitchcock* in Amer. Gr. Nat. Herb. no. 348 (no. 347 of the same series, as represented in the Gray Herbarium is not *A. borealis*). BRITISH COLUMBIA: small peak above timber line, Selkirk Mts., *Shaw*, no. 1019, as *A. varians.*

Forma **macrantha** (Eames), n. comb. Var. *macrantha* Eames, RHODORA, xi. 88 (1909).—Spikelets proliferating or "viviparous." Perhaps pathogenic. NEWFOUNDLAND: Blow-me-down Mts., *Eames & Godfrey*, no. 5833 (TYPE collection); Lark Mountain, *Fernald, Long & Fogg*, no. 87. QUEBEC: Rivière Mingan, *Victorin & Rolland*, no. 24,754. NEW HAMPSHIRE: Alpine Garden, Mt. Washington, *Pease*, no. 1742.

*Var. **americana** (Scribn.), n. comb. *A. Pickeringii* Tuckerm. Hovey's Mag. Hort. ix. 143 (April, 1843), Am. Journ. Sci. xlv. 42 (April–June, 1843), excl. *β. rupicola. A. rupestris* Chapm. Fl. So. U. S. 551 (1860), not All. *A. novae-angliae* Vasey, Contr. U. S. Nat. Herb. iii. 76 (1892), in part (excl. synonym), not Tuckerm. *A. rubra*, var. *americana* Scribn. Grasses of Tenn. pt. ii. 77, t. xxv. fig. 100 (1894).—Western Newfoundland and eastern Quebec to mountains of Maine and New Hampshire; Roan Mt., North Carolina and Tennessee. The following are characteristic. NEWFOUNDLAND: Overfall of Deer Pond Brook, Highlands of St. John, *Wiegand, Gilbert & Hotchkiss*, no. 27,476, no. 27,477 (with habit of var. *paludosa*); Southwest Gulch, Bard Harbor Hill, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 27,478; Yellow Brook, Doctor Hill, *Fernald, Long & Fogg*, no. 1313. QUEBEC: Blanc Sablon ("Labrador"), *Fernald & Wiegand*, no. 2523; Lac du Vieillard, Gaspé Co., *Fernald, Dodge & Smith*, no. 25,484; River Ste. Anne des Monts, *Fernald & Collins*, no. 414; Cap Chat River, *Fernald & Pease*, no. 24,856; Mt. Fortin, *Fernald & Pease*, no. 24,857; Grand Cascapedia River, July 12–15, 1905, *Williams, Collins & Fernald.* MAINE: on Saddle Slide, in Great Basin and by Chimney Pond, Mt. Katahdin, July 10–13, 1900, *Fernald.* NEW HAMPSHIRE: White Mts., *E. Tuckerman* (TYPE or duplicate type of *A. Pickeringii* Tuckerm.; "in monte Great Hay-

stack," *Tuckerman;* margins of alpine brooks, White Mts., September 1, 1877, *Pringle* (TYPE collection of *A. novae-angliae* Vasey, acc. to Hitchcock, U. S. Dept. Agric. Bur. Pl. Ind. Bull. no. 68: 53); Lake of Clouds, Mt. Washington, *Faxon, Fuller, Williams et al.;* Oakes Gulf, Mt. Washington, *Faxon;* Tuckerman's Ravine, Mt. Washington, *Faxon et al.;* Cape Horn, Mt. Washington, *Faxon, Churchill;* Great Gulf, Mt. Washington, *Faxon;* Boott's Spur, Mt. Washington, *Williams;* Mt. Monroe, September 8, 1862, *Wm. Boott;* Mt. Lafayette, July 29, 1863, *Wm. Boott;* Eagle Cliff, Franconia, *Fernald & Smiley*, no. 11,533. NORTH CAROLINA: "In monte Roan dicto," July, 1841, *Gray & Carey*, labeled and reported (Am. Journ. Sci. xlii. 42 (1842)) without description as *A. rupestris;* Roan Mt. July, 1889, Scribner (TYPE collection of *A. rubra*, var. *americana*).

Agrostis canina, var. ? *tenella* was described by Torrey from "Mountains in the northern part of the State [of New York]," with "leaves linear, flat . . . a little more than a line wide." It might have been var. *americana*, but the description is quite as satisfactory for a well grown var. *typica*. The latter is the only form seen from the Adirondacks and Dr. E. D. Merrill informs me that Torrey apparently preserved no specimen to stand for his *A. canina*, var. ? *tenella*. I am, therefore, leaving it with typical *A. borealis*.

Agrostis rubra, var. *americana* was clearly published by Scribner in his Grasses of Tennessee (1894), with a good description, clear illustration and the citation of *A. rupestris* Chapm., not All., as a synonym. It was known to Scribner only from "Near the summit of Roane mountain." Var. *americana* had had an earlier but invalid publication in synonymy. In his Catalogue of Canadian Plants, ii. 391 (1890) Macoun published the following note:

(2763.) **A. canina**, Linn.; Macoun, Cat. IV., 198.

Prof. Scribner says of this species: "This is *A. rubra*, Linn. May be called *A. rubra*, Linn., var. *Americana*. It is the same as *A. rupestris*, Chapm. (non All.), found on Roan Mountain, North Carolina. The same plant grows on the White Mountains of New Hampshire (*A. canina*, var. *alpina*, Oakes) together with the true *A. rupestris* All." (Scribner.) Our specimens from Mount Albert, Gaspé, Q., belong to *A. rubra*, var. *Americana*. (*Macoun.*)

Macoun's publication may be viewed in different ways. It may be said that he published *A. rubra*, var. *americana* in synonymy (under *A. canina*), in which case he gave it no nomenclatural status; consequently Scribner's later account was the first *valid* publication of the name. If it be maintained that Macoun's publication was valid, then the only characterization of the new variety is Chapman's description of the Roan Mt. plant as *A. rupestris*. In either case the result

Fig. 1, Carex incurva, var. setina from Newfoundland; fig. 2, C. Langeana from Newfoundland; both × 1.

is the same; the Roan Mt. plant has the large spikelets of *A. Pickeringii* Tuckerm. and *A. novae-angliae* Vasey, not Tuckerm., though it is a low and narrow-leaved form.

Var. **paludosa** (Scribn.), n. comb. *A. paludosa* Scribn. U. S. Dept. Agric. Div. Agrost. Bull. no. 11: 49 (1898); Hitchc. U. S. Dept. Agric. Bur. Pl. Ind. Bull. 68: 53, 54, fig. 2 (1905); Fernald, RHODORA, xxviii. 118, 161 (1926). *A. melaleuca* Fernald, l. c. 63, 109, 161 (1926), not Hitchc.—Labrador, northwestern Newfoundland and eastern Saguenay Co., Quebec. LABRADOR: rocky beach, Tikkoatokok Bay, lat. 57°, *Bishop*, no. 58. NEWFOUNDLAND: springy swale south of the Hospital, Flower Cove, *Fernald, Long & Dunbar*, no. 26,280 as *A. melaleuca;* boggy swale near the Rock Marsh, Flower Cove, *Fernald, Pease & Long*, no. 27,481, *Fernald*, no. 27,483, both as *A. melaleuca;* dripping quartzite cliffs and ledges, upper Deer Pond Brook, Highlands of St. John, *Fernald & Long*, no. 27,482, as *A. melaleuca;* dry gravelly limestone barrens, St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 27,479 (starved specimen); dry gravelly limestone barrens, Pointe Riche, *Fernald, Long & Fogg*, no. 1308 (starved specimen). QUEBEC: in barren spots on the gneiss plain, Blanc Sablon ("Labrador"), *Fernald & Wiegand*, no. 2528 (the type was collected by Waghorne at Blanc Sablon); sand-dunes, Blanc Sablon River ("Labrador") *Fernald, Wiegand & Long*, no. 27,480; "Labrador," *Martin;* rocky crest, Ile Ouapitagone, *St. John*, no. 90,123.

Fernald, Long & Dunbar, no. 26,253 from Flower Cove, Newfoundland, and *Wiegand, Gilbert & Hotchkiss*, no. 27,477 from Deer Pond Brook, Newfoundland, have the panicle-branches strongly ascending as in var. *paludosa* but many of their lemmas are awned as in var. *americana*.

*AGROSTIS SCABRA Willd., forma **Tuckermani**, f. nov., lemmatibus aristigeris.—Rarely through the range of the typical awnless form, Newfoundland to New England. TYPE: sandy flats of Monatiquoit River, above Union Street, Braintree, Massachusetts, July 1, 1911, *J. R. Churchill* (in Gray Herb.). The Newfoundland collections are from CONCEPTION BAY: talus of sandstone cliffs, Western Bay, *G. S. Torrey*, no. 111. FORTUNE BAY: silicious gravelly slope, Harbour Breton, *Fernald, Long & Dunbar*, no. 26,250.

Agrostis scabra Willd. Sp. Pl. i. 370 (1798) is the plant which long correctly passed under that name. In 1905 it was merged by Hitchcock, N. Am. Sp. Agrostis (U. S. Dept. Agric. Bur. Pl. Ind. Bull. no. 68), 42, with *A. hyemalis* (Walt.) BSP. Prelim. Cat. N. Y. 68 (1888), which, in turn, was based on *Cornucopiae hyemalis* Walt. Fl. Carol. 73 (1788). Walter lived at Santee, South Carolina; consequently it is natural to identify his *C. hyemalis* as a plant of eastern South Carolina.

According to Hitchcock there is no specimen preserved in the Walter herbarium but Walter's brief diagnosis well describes the common plant of South Carolina:

hyemalis. 1. culmo erecto, panicula diffusa verticillata, foliis angustis subteretibus [misquoted by Hitchcock "sub-erectibus"].

This, so far as it goes, sufficiently describes the species (PLATE 246; FIGS. 1, 2 and *a*) of eastern Virginia, North and South Carolina, Georgia and Florida, which begins flowering in early spring (March and early April; northward, in New Jersey, southern New York and southern New England in May), the beautifully distinct species clearly characterized, 120 years after Walter, as *Agrostis antecedens* Bicknell, Bull. Torr. Bot. Cl. xxxv. 473 (1908). This southern early-flowering species (PLATE 246, FIGS. 1 and 2), with mostly involute-filiform leaves and very lax panicles mostly 0.5–2 (rarely –3) dm. long, has the filiform branches simple or forked only near the tip; the tiny spikelets (1.2–2 mm. long) subsessile or only short-pedicelled and crowded in close spiciform terminal glomerules 2–10 mm. long; the tips of the glumes distant in fruit (FIG. *a*), thus exposing the grain; the lemma 0.5–1 mm. long; the tiny (about 0.2 mm. long) anthers roundish. It is common from Florida to Texas, extending north on and near the Coastal Plain to Rhode Island and Massachusetts, and in the interior to Kansas, Iowa, Illinois and Indiana; it abounds in Walter's region.

Agrostis scabra is coarser throughout, with cauline leaves usually broader and flat; the panicle, when well developed much larger, with the branches forking lower down and in maturity gibbous at base; the spikelets mostly longer-pedicelled, 2–4.3 (in typical *A. scabra* 2–3) mm. long; the glumes connivent in fruit, covering the grain; the lemmas 1.3–2.5 (in typical *A. scabra* 1.3–2) mm. long; the anthers larger and elongate. *A. scabra* in its various forms abounds from Labrador and Newfoundland to Alaska, south to Pennsylvania, the Great Lakes states, Iowa, Nebraska, New Mexico, Arizona and California. In the region where its range meets that of *A. hyemalis* (*A. antecedens*), *A. scabra* begins flowering when the former is wholly mature, from late June to August. This mid-summer species does not reach Walter's country and the name *hyemalis* would be meaningless if applied to it; for a plant which begins flowering in March and which, in the South, is mature in April it is at least less inappropriate. Willdenow's

characterization of *A. scabra* was clearly based on the coarser and more northern plant: . . . "Folia *linearia* . . . Panicula *ramosa divaricata ampla, fere pedalis,*" etc.

Agrostis scabra, f. *Tuckermani* is unquestionably the plant from "Notch of the White Mountains" described as *A. laxiflora, β montana* Tuckerm. Am. Journ. Sci. xlv. 43 (1843) "palea arista tortili exserta e medio dorsi proveniente praedita." Tuckerman's plant is in the Gray Herbarium but, unfortunately, he involved the typification by citing as its nomenclatural basis "*Trichodium montanum, Torr. (fide ips.) Torr. Fl.* i. 84." The original description of *T. montanum* Torr. Compend. 50 (1826) mentions no awn; and, although Hitchcock (N. Am. Sp. Agrost. 43) says "In the mountains of New England is a form which has awned spikelets. . . This form has been named —*Trichodium montanum* Torr., Comp. 50. 1826," he states very definitely that "Torrey's specimen is in the Torrey herbarium . . . the flowering glume is awnless" and the type of the "New England" plant was "collected on 'summit of the New Beacon, Fishkill [New York]'". With the typification of *A. laxiflora, β. montana* thus involved, it is wiser to redesignate the form of *A. scabra* with awned lemmas and to assign it an unequivocal type.

The name *Agrostis laxiflora* Richardson (1823) goes back to *Trichodium laxiflorum* Michaux, Fl. Bor.-Am. i. 42, t. 8 (1803). Michaux's plate shows very characteristic *A. hyemalis* (*A. antecedens*) and he cited as an unquestioned synonym *Cornucopiae hyemalis* Walt. *A. aphanes* Trin. Agrost. ii. 100 (1841) from Newfoundland is presumably a green state of *A. scabra*. Its flat leaves, more or less spreading panicle "*lucidissimae*," its hispid rays up to 3½ inches long, its awnless lemma and its short-pilose callus are all characters of *A. scabra*.

*A. SCABRA, var. **septentrionalis** var. nov. (TAB. 246, FIGS. 3 and *b*), spiculis 3.2–4.3 mm. longis; glumis lanceolato-attenuatis apice subaristatis; lemmatibus 2–2.5 mm. longis.—Labrador to Nova Scotia. LABRADOR: sandy shore of island near mouth of Naskaupi River, Lake Melville, August 4, 1921, *Wetmore*, no. 103,103. NEWFOUNDLAND: dry sterile meadow at head of Mauve Bay, August 12, 1925, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 27,468; glades in spruce swamp, Brig Bay, Aug. 7, 1924, *Fernald, Long & Dunbar*, no. 26,252; open savannah near mouth of Main River, Bonne Bay, August 27, 1929, *Fernald & Long*, no. 1306; dry serpentine slopes near Winterhouse Brook, Bonne Bay, August 8, 1929, *Fernald, Long & Fogg*, no. 1310 (TYPE in Gray Herb.); St. George's, July 29, 1922,

Mackenzie & Griscom, no. 11,144; wet thicket on gneiss hills, Burgeo, September 15, 1926, *Fernald, Long & Fogg*, no. 81 (many spikelets modified by nematodes); knolls in wet bog-barrens, Trepassey, August 16, 1924, *Fernald, Long & Dunbar*, no. 26,252. QUEBEC: près des chutes, Natashquan, 31 juillet, 1928, *Victorin & Rolland*, no. 28,097; various stations, Anticosti, *Victorin & Rolland*, nos. 27,818–27,822. MAGDALEN ISLANDS: wet bogs among the sand ridges back of the Narrows, Alright Island, August 21, 1912, *Fernald, Long & St. John*, no. 6850; Grand-Étang sur la Dune du Nord, Ile de la Grande-Entrée, 9 août, 1919, *Victorin & Rolland*, no. 9017; sprawling in dry clearing, Brion Island, August 8, 1914, *St. John*, no. 1766. NOVA SCOTIA: swampy edge of fresh water pond and dune hollows, Sable Island, August 27 and 30, 1913, *St. John*, nos. 1165, 1166; springy sphagnous bog in spruce woods near mouth of Broad River, August 16, 1920, *Fernald & Bissell*, no. 19,913; dryish sphagnous swales and bogs by Harris's Lake, Tiddville, August 22, 1920, *Fernald & Long*, no. 19,914; swampy spruce woods and thickets by Minnigobake Lake, Belleville, July 29, 1920, *Long & Linder*, no. 19,900; wet peaty sloughs in barrens, Lower Argyle, August 11, 1920, *Fernald, Bissell, Graves, Long & Linder*, no. 19,911, in part; sphagnous swales bordering Salmon (Greenville) Lake, August 13, 1920, *Fernald, Bissell, Graves, Long & Linder*, no. 19,912; wet savannah bordering Goven Lake, July 23, 1921, *Fernald, Bartram & Long*, no. 23,267.

*Var. SEPTENTRIONALIS, forma **setigera**, f. nov., lemmatibus setigeris.—Range of the awnless form, often more abundant. NEWFOUNDLAND: swampy woods, Bell Island, Conception Bay, August, 1901, *Howe & Lang*, no. 1302; Grand Lake, 1908, *Owen Bryant*; serpentine tableland, alt. 380 m., Bonne Bay, August 27, 1910, *Fernald & Wiegand*, no. 2514; open peat bogs, Birchy Cove (Curling), August 10, 1910, *Fernald & Wiegand*, no. 2513; sphagnous marsh, Lark Harbor, August 31, 1926, *Fernald, Long & Fogg*, no. 78; dry meadows, Bay St. George, August 5–7, 1901, *Howe & Lang*, no. 1013; wet moss and peat on the gneiss hills near Sand Bank, west of Burgeo, September 9, 1926, *Fernald, Long & Fogg*, no. 79 (TYPE in Gray Herb.); crests and crevices of gneiss ledges, Burgeo, September 10 and 15, 1926, *Fernald, Long & Fogg*, nos. 80, 84, 85. QUEBEC: gneiss ledges, Mutton Bay, September 7, 1925, *Fernald & Long*, no. 27,467; sur les rochers granitiques près de l'embouchure, Rivière Romaine, 20 juillet, 1925, *Victorin, Rolland & Louis-Marie*, no. 20,635. MAGDALEN ISLANDS: sphagnous boggy margin of pond, southeast of Étang du Nord, and dry open woods and clearings, Étang du Nord, Grindstone Island, July 24, 1912, *Fernald, Bartram, Long & St. John*, nos. 6847, 6848; wet bogs and mossy pond-margins, between East Cape and East Point, Coffin Island, August 17, 1912, *Fernald, Long & St. John*, no. 6851; dunes de la Pointe de l'Est, 29 juillet, 1919, *Victorin & Rolland*, no. 9018. NOVA SCOTIA: peat bog at head of White Spring, St. Paul Island, August 6, 1929, *Perry & Roscoe*, no.

51; Canso, July 18, 1901, *Fowler;* spruce swamp, Markland (Cape Forchu), August 22, 1921, *Fernald & Long*, no. 23,272.

When not called *Agrostis scabra* or *A. hyemalis, A. scabra*, var. *septentrionalis* (including f. *setigera*) has been distributed either as *A. borealis* Hartm., *A. geminata* Trin., *A. elata* (Pursh) Trin., *A. hyemalis* var. *geminata* (Trin.) Hitchc. or *A. hyemalis*, var. *elata* (Pursh) Fern. From *A. borealis* it is at once separated by its long and flexuous strongly hirtellous branches which place it with *A. scabra*. From *A. geminata* it is distinguished by the very diffuse and flexuous prolonged branches, the panicle ⅓–⅔ the full height of the plant, the mature and strongly divergent or reflexed branches strongly gibbous at base, and the ligules 4–7 mm. long; *A. geminata* having the mature panicle smaller and more regularly ovoid, only $^1/_6$– very rarely $^1/_2$ the full height of the plant, its stiffer or merely arching shorter branches scarcely gibbous at base and the ligule of the usually shorter cauline leaves 1.5– rarely 4 mm. long. *A. scabra* var. *septentrionalis* has often been confused with the southern Coastal Plain *A. elata* (Pursh) Trin. and when I made the combination *A. hyemalis* var. *elata* (Pursh) Fern. RHODORA, xxiii. 229 (1922) I was influenced by the fact that the plant of Nova Scotia, the Magdalen Islands and Newfoundland is clearly an extreme of *A. scabra* (at that time confused with *A. hyemalis*). In *A. elata*, however, the cauline leaves are numerous (5–10), in *A. scabra*, var. *septentrionalis* only 2–4; the panicle is lanceolate to narrowly ovoid, not diffuse; and the lemma is conspicuously dark-nerved, nearly as long as the glumes, the lemma of *A. scabra* not evidently nerved and much shorter.

AGROSTIS GEMINATA Trin., forma **exaristata**, f. nov., lemmatibus muticis exaristatis.—Throughout the range of the typical form with awned lemmas, often more abundant. TYPE: muddy border of small lake at about 530 m. alt., back of North Fork Camp, North Fork of Madeleine River, Gaspé Co., Quebec, August 12, 1923, *Fernald, Dodge & Smith*, no. 25,485 (in Gray Herb.).

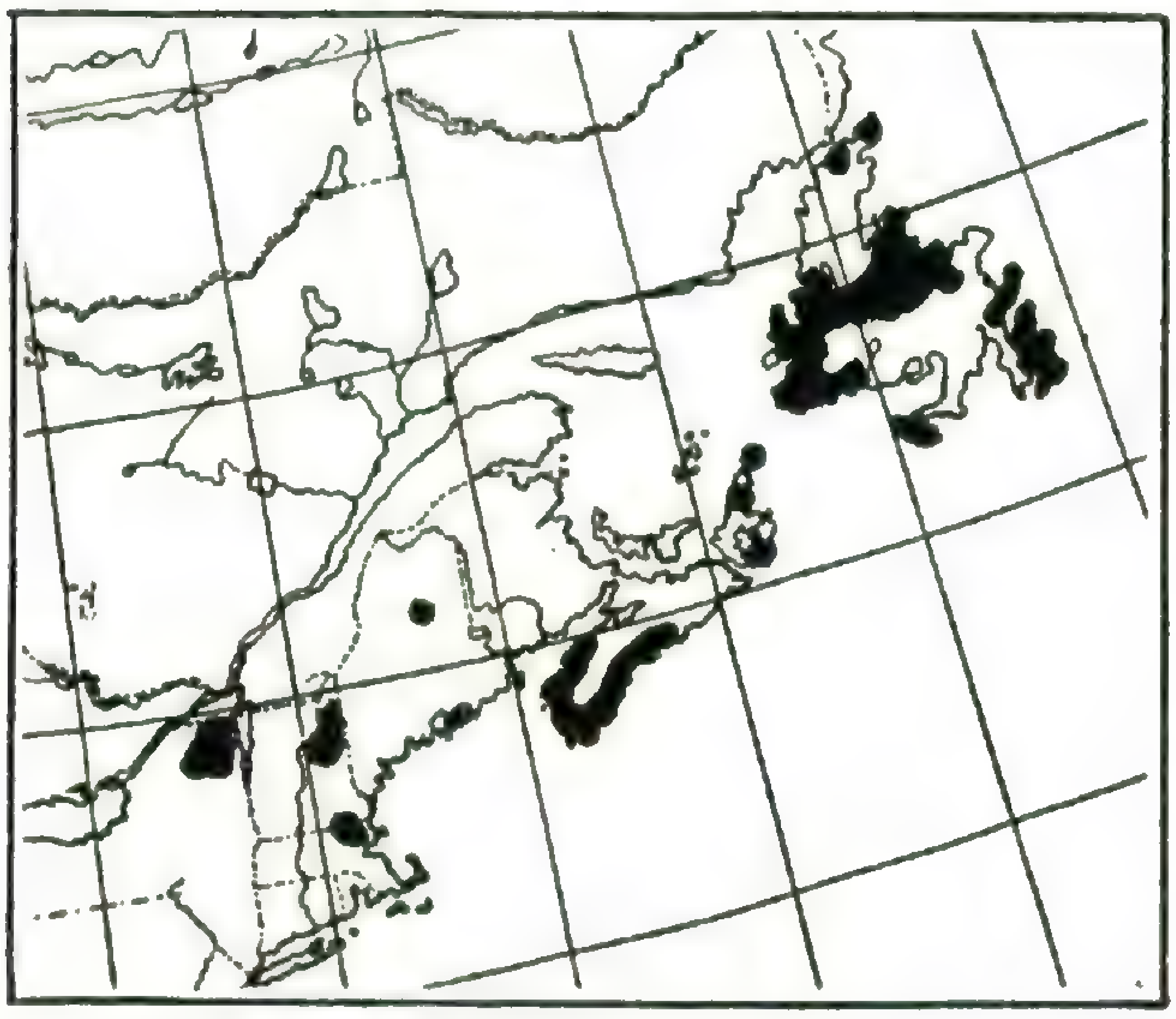
Although *Agrostis geminata* is treated by Hitchcock as a variety of *A. hyemalis* (i. e. *A. scabra*), and where the two grow together they seem to merge, the same may be said of *A. geminata* and *A. borealis* Hartm. *A. geminata* is one of the strong links in a chain of somewhat confluent species (*A. scabra, A. perennans* Tuckerm., *A. elata* (Pursh.) Trin., *A. geminata, A. borealis* and *A. canina* L.; and doubtless others.) Only confusion would result from merging them all as one species. It seems better to treat them as reasonably distinct

species which at their meeting-places are occasionally interfertile. Such conditions are familiar in many northern groups.

The Newfoundland collections of

*A. geminata, f. exaristata are the following. Avalon Peninsula: dry peaty or gravelly silicious barrens, Trepassey, *Fernald, Long & Dunbar*, no. 26,263. Straits of Belle Isle: wet boggy tundra, Quirpon Island, *Fernald & Long*, no. 27,471. Ha-Ha Bay: trap ledges, Piton Point, *Wiegand, Gilbert & Hotchkiss*, no. 27,469. Ingornachoix Bay: limestone barrens, Pointe Riche, *Fernald, Wiegand & Kittredge*, no. 2527. Cape St. George: dry limestone barrens, Green Gardens, *Mackenzie & Griscom*, no. 11,080.

Calamagrostis Pickeringii Gray. and var. debilis (Kearney) Fernald & Wiegand. Map 20. Both of general range over southern, central and eastern Newfoundland and in the East extending to the eastern shores of the Straits of Belle Isle. Near the West Coast our northernmost stations are the tablelands of Bonne Bay.



Map 20. Range of Calamagrostis Pickeringii.

As an apparently old type, of pre-Wisconsin dispersal, *Calamagrostis Pickeringii* is notable. Dominant on peaty barrens at all levels in Newfoundland and Nova Scotia, it is absent from New Brunswick and most of Maine, but reappears in the alpine areas of Mt. Katahdin, the White Mts., the northern Green Mts. and the Adirondacks, whence it occasionally descends to the valleys. It has an isolated area in northeastern Massachusetts and adjacent southeastern New Hampshire (where the long-weathered till gives evidence of very early, rather than recent, glaciation); and there is an outlying area for a related plant (perhaps specifically separable) in northern Michigan. The range of the species is, emphatically, a disrupted one. The nearest allies of *C. Pickeringii* (sharing with it the prolonged and geniculate or twisted awn) are *C. Porteri* Gray and *C. perplexa* Scribn. *C. Porteri* is one of the rarest of relic-species, with four isolated stations: one each, on rocky wooded slopes, in Chemung Co., New York; Huntingdon Co., Pennsylvania;

and Page and Giles Cos., western Virginia. *C. perplexa* is even rarer: with the original station a bluff in Tompkins Co., New York, the other (for a similar but not quite identical plant) a quartzite cliff in Piscataquis Co., Maine.

Also having a geniculate and exserted awn is the arctic *Calamagrostis purpurascens* R. Br., likewise with a remarkably disrupted range: the unglaciated margin of Greenland; arctic northwestern Canada, thence along the Cordillera to South Dakota, Colorado, Nevada and California; with the only known station in the East (south of Greenland) a single colony on one of the highest cliffs of Bic, Quebec.[1]

The senility of this group of relic-species is in striking contrast to the aggressive and hopelessly variable complex which we call *Calamagrostis canadensis* (Michx.) Nutt., dominant and continuously spread across the cool-temperate, only recently available (since the Wisconsin) regions of Canada and the Northern States.

C. INEXPANSA Gray, var. ROBUSTA (Vasey) Stebbins, RHODORA, xxxii. 48 (1930). *C. hyperborea*, in part, of Newfoundland records, not Lange. One of the commonest grasses of western Newfoundland, chiefly in calcareous or magnesian soils, both wet and dry and at all altitudes. Our northern-most station is on the STRAITS OF BELLE ISLE: Rock Marsh, Flower Cove, *Fernald, Long & Dunbar*, no. 16,272; the most southern on PORT AU PORT BAY: Table Mt., *Fernald, Wiegand & Kittredge*, no. 2558. From central Newfoundland we know it from Grand Lake, *Waghorne*, no. 43; and Bishop Falls, *Fernald, Wiegand & Darlington*, no. 4582.

Except for its occurrence in Newfoundland and the closely allied region of Quebec (Côte Nord, Mingan Islands, Anticosti and Gaspé) var. *robusta* is cordilleran.

[1] Typical *Calamagrostis purpurascens* occurs in easternmost Asia, south, locally, to the highest mountains of Japan. It is *C. purpurascens*, var. *parvigluma* (Takada) Miyabe & Kudo, Journ. Fac. Agr. Hokkaido Imp. Univ. Sapporo, xxvi. pt. 2: 145 (July 15, 1931), based on *C. urelytra*, *β. parvigluma* Takeda, Tokyo Bot. Mag. xxiv. 37 (1910). Miyabe & Kudo treat *C. urelytra*, *α. macrantha* Takeda with "Glumis sterilibus 8–10–12 mm longis" as typical *C. purpurascens* R. Br. and they transfer his *C. urelytra*, *β. parvigluma* with "Glumis sterilibus 6–7 mm longis" to varietal rank under *C. purpurascens*. Three plants of Richardson's original material upon which *C. purpurascens* R. Br. was based, preserved in the Gray Herbarium, and spikelets from the type sent by Hooker to Asa Gray show the glumes to be consistently 5.5–6.5 mm. long. Consequently, *C. purpurascens*, var. *parvigluma* (*C. urelytra*, var. *parvigluma*) is scarcely separable from it. The plant of northern Japan and the Kurile Islands with extraordinarily large spikelets ("Glumis sterilibus 8–10–12 mm longis") is, then, the extreme departure from typical *C. purpurascens*. It becomes

CALAMAGROSTIS PURPURASCENS R. Br., var. **macrantha** (Takeda), comb. nov. *C. urelytra* Hack., *α. macrantha* Takeda, Tokyo Bot. Mag. xxiv. 36 (1910). *C. purpurascens* Mayabe & Kudo, Journ. Fac. Agr. Hokkaido Imp. Univ. Sapporo, xxiv. 146 (1931), not R. Br.

C. inexpansa, var. brevior (Vasey) Stebbins, l. c. 50. *C. hyperborea elongata* and *hyperborea americana* Kearney. Judged by the number of collections, much less common than var. *robusta.* The Newfoundland collections identified by Stebbins are the following. Valley of the Exploits: ledges, talus and gravel (calcareous), Grand Falls, *Fernald, Wiegand, Bartram & Darlington,* nos. 4583, 4584; rocky shore, Buchan Junction, July 19, 1930, *K. P. Jansson.* Highlands of St. John: dry white limestone bluff opposite western escarpment of Bard Harbor Hill, *Fernald & Long,* no. 27,498. St. John Bay: swale back of beach, Bard Harbor, *Wiegand, Gilbert & Hotchkiss,* no. 27,497. Bonne Bay: thicket bordering marl-pond, Storehouse Cove, *Fernald, Long & Fogg,* no. 1322; limestone cliffs and talus, Tucker's Head, no. 1323; open savannah and springy swale near mouth of Main River, *Fernald & Long,* nos. 1324, 1325. Valley of the Humber: dry limestone gravel, Hannah's Head, *Fernald & Long,* no. 1318. Cape St. George: headlands of the Cape, *Mackenzie & Griscom,* no. 11,117.

All other material distributed by me as *Calamagrostis hyperborea* belongs to *C. inexpansa,* var. *robusta.*

C. neglecta (Ehrh.) Gaertn., Meyer & Scherb. See Stebbins, l. c. 53. In Newfoundland *C. neglecta* is far less common than the varieties of *C. inexpansa.* The following are identified by Stebbins as typical. Sacred Bay: bog barren ("mesh") south of Ship Cove, *Fernald, Wiegand & Long,* no. 27,492. Pistolet Bay: gravelly and turfy strand near Isthmus Cove, *Wiegand, Gilbert & Hotchkiss,* no. 27,491. St. John Bay: turf overlying limestone, Savage's Island, *Fernald, Long & Fogg,* no. 1315. Port au Port Bay: wet runs and boggy spots in limestone barrens, Table Mt., *Fernald, Wiegand & Kittredge,* no. 2548.

The first two numbers were erroneously distributed as Var. *borealis.*

C. neglecta, var. borealis (Laestad.) Kearney. Rare. Pistolet Bay: tundra on southern half of Burnt Cape, *Fernald & Long,* no. 27,490. Straits of Belle Isle: swales and wet peaty limestone barrens, Capstan Point, Flower Cove, *Fernald, Long & Dunbar,* no. 26,270. Valley of the Humber: sandy lake-side, Grand Lake, *Waghorne,* no. 41.

Muhlenbergia uniflora (Muhl.) Fern., var. terrae-novae Fern. Rhodora, xxix. 11 (1927). Plate 241, figs. 1 and 2. Reaching its northern limit, apparently, on the tableland of Lookout Mt., Bonne Bay.

As pointed out in the original discussion of var. *terrae-novae,* it often has the spikelets with 2 or 3 florets, thus making a strong departure from typical species of *Muhlenbergia* and from the theoretical 1-flowered *Agrostideae* toward *Eragrostis* of the more primitive *Festu-*

ceae. Judged by this greater development of 2-flowered spikelets in var. *terrae-novae*, it would seem to be more primitive than the continental typical *M. uniflora*, with the spikelets mostly 1-flowered.

PHLEUM ALPINUM L. In Newfoundland known only from wet, or at least damp, situations. Its southernmost known station there is on BONNE BAY: turfy slopes below limestone crest (alt. 630 m.), Killdevil, *Fernald, Long & Fogg*, no. 1327.

In view of the preference of *Phleum alpinum* for wet slopes or meadows, it is interesting, as a corollary of the principle discussed at the close of Part II (that the Arctic flora is essentially xerophytic and that it is the xerophytic Arctic species which abound on the arid rock-barrens of the West Coast) to note that *P. alpinum* was not listed by Simmons as occurring on the Arctic Archipelago and that in Greenland its northern limit is at lat. 70° (*fide* Ostenfeld).

ORYZOPSIS ASPERIFOLIA Michx. In Newfoundland this species, of dry deciduous forest in the northeastern United States, seems to occur chiefly in the "thin thickets" bordering open barrens. In central Newfoundland it is sometimes in well developed woods, but along the West Coast it follows the limestone and serpentine barrens, as characteristic of the tablelands as of lower levels. The northernmost stations are on ST. JOHN BAY: knoll in spruce thicket (on limestone), St. John's Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 27,510; peaty thicket bordering limestone barrens, Old Port au Choix, *Fernald, Long & Fogg*, no. 1331. Compare statements regarding *Habenaria orbiculata* (pp. 8, 87) and *H. Hookeri* (p. 57).

O. CANADENSIS (Poir.) Torr. (*Oryzopsis pungens* (Torr.) Hitchc.; *Stipa canadensis* Poir.). Probably of general occurrence in central and southern Newfoundland. The specimens at hand are few. VALLEY OF THE EXPLOITS: granitic ledges and gravel along a brook, Quarry, *Fernald, Wiegand & Bartram*, no. 4529; moist woods, Buchan Junction, July 12, 1930, *K. P. Jansson*. BAY OF ISLANDS: diorite tableland, alt. about 550 m., Blomidon, *Fernald & Wiegand*, no. 2490, *Mackenzie & Griscom*, no. 10,063; peaty and turfy subalpine meadow, Lark Mt., *Fernald, Long & Fogg*, no. 104. DISTRICT OF BURGEO AND LA POILE: in *Cladonia*-heath on dry gneiss slopes along Grandy Brook, *Fernald, Long & Fogg*, no. 105.

SPARTINA PECTINATA Link. Extended north to BONNE BAY: gravel along Deer Brook, *Fernald, Long & Fogg*, no. 1333.

ELEOCHARIS PARVULA (R. & S.) Link (*Scirpus nanus* Spreng.). Extended north to BONNE BAY: brackish gravel-flat at mouth of McKenzie River, *Fernald, Long & Fogg*, no. 1337.

E. UNIGLUMIS (Link) Schultes, var. HALOPHILA Fern. & Brackett, RHODORA, xxxi. 72, t. 183 (1929). Extended north from Bay St.

George, to Bonne Bay: brackish tidal mud-flats at mouth of Main River, *Fernald, Long & Fogg*, no. 1341.

*E. acicularis (L.) R. & S., var. submersa (Hj. Nilss.) Svenson, Rhodora, xxxi. 188 (1929). The first station known south of the Labrador Peninsula is on Bonne Bay: brackish mud-flats at mouth of Main River, *Fernald, Long & Fogg*, no. 1344. See p. 90.

Scirpus cespitosus, var. delicatulus Fern., Rhodora, xxiii. 25 (1921). To the original Newfoundland station on the Gander River may be added one on Bonne Bay: gravel along Deer Brook, *Fernald, Long & Fogg*, no. 1349.

S. americanus Pers. Extended north to Bonne Bay: tidal mud and gravel at mouth of Main River, *Fernald & Long*, no. 1354; plants all sterile.

S. acutus Muhl. The northernmost known station is on Bay of Islands: marshy border of pond at foot of serpentine ridge, North Arm, *Long & Fogg*, no. 113.

Eriophorum opacum (Bjornstr.) Fern. See Rhodora, xxvii. 208 (1925). Extended south to St. John Bay and Ingornachoix Bay: damp open depressions in limestone barrens, Old Port au Choix and Pointe Riche, *Fernald, Long & Fogg*, nos. 1359, 1360.

*Rynchospora capillacea Torr., var. leviseta E. J. Hill. Bonne Bay: bogs, July 26, 1930, *K. P. Jansson;* the first station east of the Kennebec River, Maine, although typical *R. capillacea* occurs on the Gaspé Peninsula.

Carex incurva Lightf. Extended south to St. John Bay: turf overlying limestone, Grassy Island and Savage's Island, *Fernald, Long & Fogg*, nos. 1371, 1372; very luxuriant colonies, up to 2.1 dm. high. See p. 60.

*C. incurva Lightf., var. setina Christ in Scheutz, Pl. Vasc. Jeniseens. 174 (1888)—Kongl. Svensk. Vet.-Akad. Handl. xxii. No. 10: 174 (1888). Damp clay and gravel of limestone barrens, Gargamelle Cove, Ingornachoix Bay, *Fernald, Long & Fogg*, no. 1373. Plate 247, map 4, p. 56.

The type of var. *setina* came from lat. 70° 10′, near the mouth of the Jenisei. I have seen none of the original material but our plant is quite like the collection from Advent Bay, Spitzbergen, August 8, 1868, *Th. M. Fries*, which is cited by Kükenthal in Engler, Pflanzenr. iv[20]. 114 (1909) as var. *setina*. Kükenthal cites other specimens from Samojeden, Nova Zembla, Tschutchesland and western Greenland; and in the Gray Herbarium there are specimens from Jugor Straits, Arctic Russia; Jan Mayen; western Greenland and Ellesmereland; all close to or to the north of the Arctic Circle. The occurrence at sea-level at lat. 50° 43′ in western Newfoundland of this characteristically Arctic extreme of the species adds another to the many records of

Arctic types from that region. Kükenthal's description, "Culmus humilis subabsconditus. Spiculae pauciores pauciflorae" covers the essential points of the variety but the following more detailed contrast with typical *C. incurva* may be of value.

C. INCURVA (typical). Culms up to 25 cm. long: leaves up to 15 cm. long: fruiting head 8–14 cm. in diameter: perigynia 3.5–5 mm. long.

Var. SETINA. Culms 1 mm.–2 cm. long: leaves 1–3.5 cm. long: fruiting head 4–7 mm. in diameter: perigynia 3–3.5 mm. long.

Kükenthal refers to *Carex incurva*, var. *setina* the Greenland plant described and illustrated by Lange as *C. duriuscula* Lange, Fl. Dan. xvi. fasc. xlviii. 10, t. mmdccexliii (1871). Lange supposed his plant to be *C. duriuscula* C. A. Meyer. That it is quite distinct from both *C. duriuscula* C. A. Meyer and from *C. incurva*, var. *setina* will appear in the discussion of the next species.

*CAREX **Langeana**, nom. nov. *C. duriuscula* Lange, Fl. Dan. xvi. fasc. xlviii. 10, t. mmdcccxliii (1871), as to Greenland plant, not C. A. Meyer, Mém. Acad. St. Pétersb. i. 214, t. VIII (1831). PLATE 247.

A plant of western Newfoundland, forming close turf on dry peaty limestone barrens bordering Gargamelle Cove, Ingornachoix Bay, *Fernald, Long & Fogg*, no. 1374, seems to be quite identical with the plant described and beautifully illustrated by Lange as *C. duriuscula.* Lange supposed the Greenland plant to be *C. duriuscula* C. A. Meyer and in his *Conspectus Florae Groenlandicae*, 134 (1880) and pt. 2: 288 (1887) he so maintained it, in each case holding it as specifically distinct from the well-known *C. incurva* Lightf., next which species Lange placed his *C. duriuscula. C. duriuscula* C. A. Meyer, as indicated in his description and plate, has the bracts ovate and acuminate, the scales of the spike ovate and acute to merely obtuse, the anthers conspicuously apiculate and the perigynia 7-nerved and toward the summit serrulate. It belongs, then, close to *C. stenophylla* Wahlenb. which shares these characters and by Trautvetter, Kükenthal and others has been referred, at least as a variety, to that species. In the Greenland plant of Lange and in the plant of western Newfoundland identified with it, the bracts are broader and rounded at summit, the anthers are blunt and the nerveless perigynia are barely roughened on the margin toward the tip; it is certainly not the same as *C. duriuscula* C. A. Meyer.

Kükenthal and other European students refer *Carex duriuscula* Lange, not C. A. Meyer, without question to *C. incurva* Lightf. or to its dwarf var. *setina* Christ; and in his treatment in *Das Pflanzen-*

reich[1] Kükenthal emphasizes his reduction of it by a mark of affirmation. Nevertheless, *C. incurva*, var. *setina*, which occurs in western Newfoundland on the same barren with *C. Langeana*, has there, as in the material from Greenland, Jan Mayen, Spitzbergen and arctic Siberia, the globose or subglobose inflorescences characteristic of all *C. incurva*, and very thin and scarious or hyaline whitish or broadly white-bordered divergent scales; *C. Langeana* has ellipsoid or thick-cylindric spikes with firmer and deep-ferruginous appressed-ascending scales with only a narrow pale border. The anthers of *C. incurva* are 1.7–2.5 mm. long, of *C. Langeana* only 1 mm. long; the perigynium of *C. incurva* is plump or subinflated, that of *C. Langeana*, as shown by Lange's immature material and by the Newfoundland collection, flat. The leaves of *C. incurva* are smooth or only slightly scabrous toward the tip; those of *C. Langeana* definitely spinulose-scabrous. It is not, therefore, satisfactory to refer *C. duriuscula* Lange (*C. Langeana*) to *C. incurva*. Lange himself, who certainly knew *C. incurva*, held them to be distinct, and the characters of the two justify his decision.

It is possible that *C. Langeana* had its origin by the crossing of *C. gynocrates* Wormsk. with *C. incurva* or *C. incurva*, var. *setina*. In the region of Newfoundland where it occurs *C. gynocrates* and *C. incurva* are common and the station for *C. Langeana* is very near our station for *C. incurva* var. *setina*. The latter as well as the larger extremes of *C. incurva* and *C. gynocrates* often fruit abundantly; while the achenes of *C. Langeana* are not well developed. Superficially *C. Langeana* strongly suggests the Arctic-European *C. Deinbolleana* Gay, which is generally accepted as a hybrid of *C. dioica* L. and *C. incurva*. The Newfoundland and Greenland representative of *C. dioica* is *C. gynocrates* and, crossed with *C. incurva*, it would undoubtedly produce a plant strongly simulating *C. Deinbolleana*. On the other hand, sterility is only negative evidence of hybrid origin. *C. gynocrates* and other unique species are often quite sterile and Simmons specially comments[2] on the frequent sterility of *C. incurva*. Lange, in his *Conspectus Florae Groenlandicae*, 134 and pt. 2: 288, cites *C. Langeana* (as *C. duriuscula*) from three definite stations; he cites *C. gynocrates* from five stations and *C. incurva* from nine, but in no case is any station for *C. Langeana* identical with any for either *C. gynocrates* or *C. incurva*. Whether the later collections of *C. Langeana*

[1] Kükenthal in Engler, Pflanzenr. IV[20]. 114 (1909).

[2] Simmons, Phytogeogr. Arct. Am. Archipel. 60 (1913).

from Greenland have good fruit I do not know, but Lange certainly gave no intimation that the plant he took to be *C. duriuscula* was not a definite species. Until the question can be further checked in the field both in Greenland and in Newfoundland, the possible hybrid origin of *C. Langeana* must remain an open question.

C. Wiegandii Mackenz. N. Am. Fl. xviii. 108 (1931). Extended north to Bonne Bay: boggy spruce thickets near Winterhouse Brook, *Fernald, Long & Fogg,* no. 1381.

C. cephalantha (Bailey) Bickn. Range extended north to Bonne Bay: swales on alluvial islands and shores at mouth of Main River, *Fernald, Long & Fogg,* no. 1384.

This material, like some other collections from western Newfoundland, has the perigynia as slender as in *C. angustior* Mackenz. The plant deserves special watching in the field.

C. Deweyana Schwein. To the very few Newfoundland stations add the following, St. John Bay: bushy swale back of Eddy's (Old Man's) Cove, *Fernald, Long & Fogg,* no. 1385. Bonne Bay: turfy slopes below limestone crest (alt. 650 m.), Killdevil, no. 1386.

C. scoparia Schkuhr. Range extended north to Bonne Bay: swales on alluvial islands and shores at mouth of Main River, *Fernald, Long & Fogg,* no. 1388.

C. hormathodes Fern. Frequent on the South Coast, its northern outposts are on Bonne Bay and Notre Dame Bay. Bonne Bay: alluvial islands and shores at mouth of Main River, *Fernald, Long & Fogg,* no. 1390; brackish swale near mouth of McKenzie River, no. 1391. Notre Dame Bay: brackish shore of Dildo Run, *Fernald, Wiegand & Bartram,* no. 4810.

* × C. **trichina,** nom. nov. *C. tenuiflora × trisperma* Fern. Rhodora, iv. 226 (1902). Valley of the Exploits: muddy shore, Buchan Junction, July 15, 1930, *K. P. Jansson.*

This hybrid is so wide-spread in occurrence and in the two stations personally known to me, so very abundant (at the type-station so abundant as easily to furnish 100 very full sheets) that it seems more convenient to have a binomial with which to refer to it. The original collection was from an extensive colony at Fort Fairfield, Maine. It is also rather abundant on a boggy shore at Blanc Sablon, Quebec Labrador, *Fernald & Wiegand,* no. 2797; and it was collected at Lansing, Michigan, July 28, 1890, by *G. H. Hicks.*

C. novae-angliae Schwein. Occasional in the southern districts, the northern known limit on Bay of Islands: brookside-thicket, French (or Tweed) Island, *Fernald, Long & Fogg,* no. 132.

C. deflexa Hornem. Frequent or common in the southern and central districts, the northern known limit in Newfoundland, whence

it "jumps" to Greenland, is on the Highlands of St. John: mossy shelves of quartzite cliff at head of Yellow Brook, Doctor Hill, *Fernald, Long & Fogg*, no. 1407.

C. concinna R. Br. To the two remote Newfoundland stations previously recorded add Pointe Riche: turfy talus of limestone sea-cliffs, *Fernald, Long & Fogg*, no. 1410.

*C. gracillima Schwein., var. humilis Bailey. Bonne Bay: margins of wet thickets along Winterhouse Brook, *Fernald, Long & Fogg*, no. 1426; thickets, gravelly shores and alluvial islands near mouth of Main River, *Fernald, Long & Fogg*, no. 1427.

*C. limosa × rariflora Norman. Pointe Riche: wet rocky run on shelf of limestone, *Fernald, Long & Fogg*, no. 1435.

Recorded by Kükenthal from a single station each, in Norway and Sweden.

*C. Buxbaumii Wahlenb., forma dilutior Kükenth. Bonne Bay: swales and margins of wet thickets along Winterhouse Brook, *Fernald, Long & Fogg*, no. 1438.

In its whitish-brown scales very strikingly contrasted with the usual dark-scaled *C. Buxbaumii*.

Carex alpina in North America.—In boreal America one of the *Carices* of the *Atratae* long and correctly passed as *C. alpina* Swartz. Recently, however, it has been the fashion to call the species *C. Halleri* Gunnerus, because the name of Gunnerus clearly antedates that of Swartz. If the change rested solely on priority of publication there would be no objection to it; but, unfortunately, Gunnerus did not understand what he was publishing and his name, *C. Halleri*, is a *nomen confusum*.

Carex alpina (*C. Halleri* of many recent authors) has the culms harsh at summit ("superne scaber"—*Kükenthal*), the leaves with scabrous-serrulate margins and midrib, the scales of the spikes purple or purplish black, without pale midnerve but with a pale hyaline margin ("Squamae ♀ parvulae . . . nigricantes clarius carinatae marginibus anguste albo-hyalinae"—*Kükenthal*). Its granular-roughened perigynia have an exceedingly short beak ("in rostrum breve . . . contracti"—*Kükenthal*). With these points in mind it is well to see just what formed the basis of *C. Halleri*. Gunnerus obviously had no material himself; his species was based on references from literature:

DCCCXLIX. CAREX (*Halleri*) spica androgyna: terminali tripartita. *Hall.* 1356. *Oed. fl. dan.* VII. 8. *t.* 403. *Scheuchz. hist. t.* 11. *f.* 8. citante Oedero.

Habitat in alpibus. Oeder.[1]

[1] Gunn. Fl. Norv. ii. 106 (1772).

The plate in Flora Danica, although crude, is recognizable as *Carex alpina;* and recent Scandinavian authors and those who have followed them have taken *C. Halleri* in that sense. It should be noted, however, that the name used by Gunnerus clearly indicates that the plant of Haller is primarily intended. Consequently, in interpreting *C. Halleri* chief weight should be given to Haller's very full description. The diagnostic phrases used by Gunnerus were taken directly from Haller's description of his no. 1356. Haller's account of the plant of Switzerland which must be taken as the type of *C. Halleri* Gunn. is so important that it should be quoted:

1356. CAREX spica terminali tripartita.†

Esset *Carex* MICHELI p. 61. f. 5. t. 33. f. 6. nisi collum bifidum diceretur.

An *Cyperoides alpinum tenuifolium, spica brevi; ferruginea* SCHEUCHZER. p. 493. t. 11. f. 8.?

In alpibus reperi, ut in mont. *Fouly*, valle *Trient;* misit etiam Cl. BELLARDUS.

Folia radicalia culmo breviora, latiuscula, ad lineam & ultra. Culmus superne nudus, triquetrus, semipedalis; non asper, ut neque folia. Spica ex tribus composita congestis. Duae laterales breviores, media longior, androgynae omnes. Glumae ovatae; mucronatae, spadiceae, linea flava divisae. Capsulae breves, ventricosae, mucrone longiusculo, simplici.

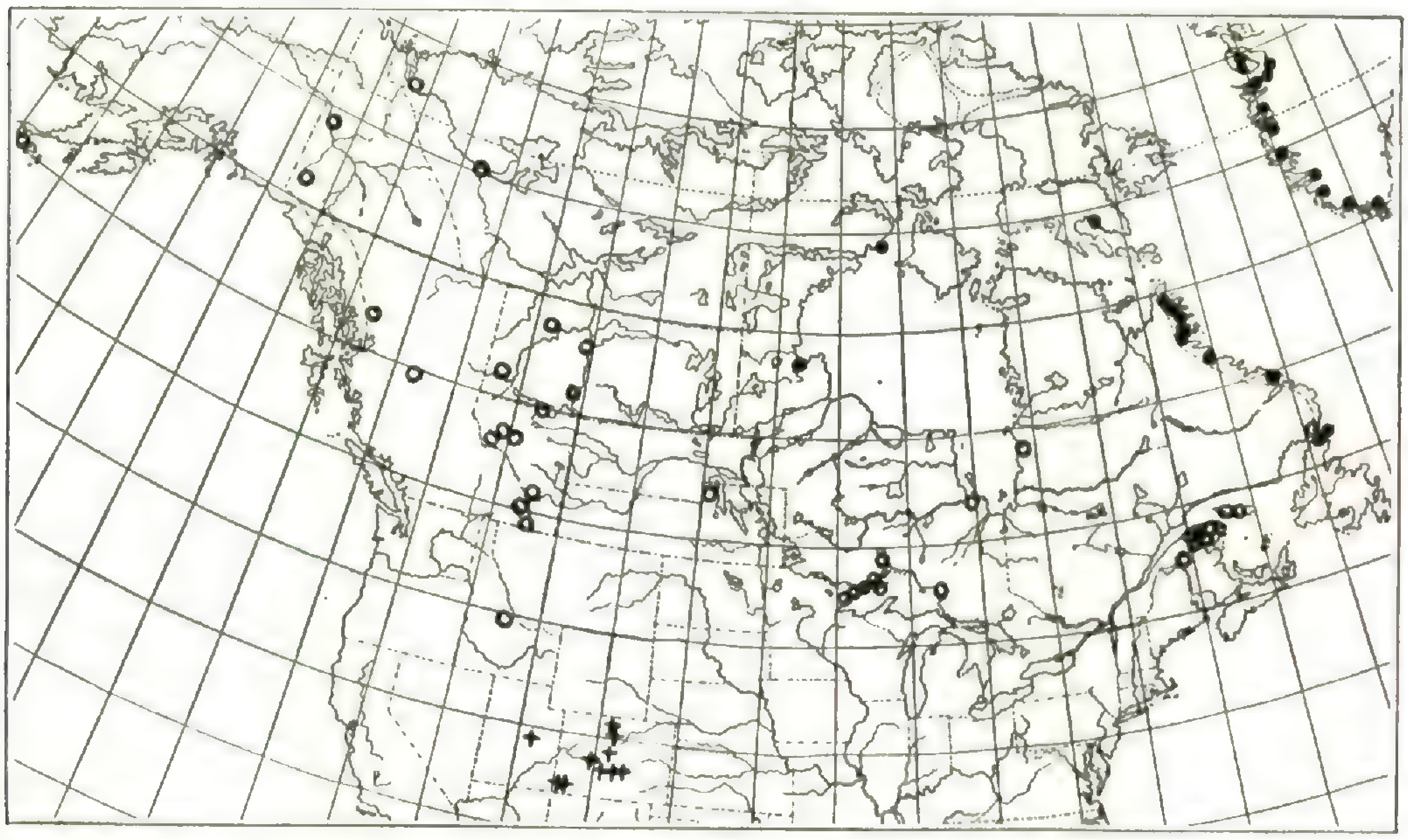
Planta SCHEUCHZERI in H. S. manifesto eadem cum 1355. Nostra magis diversa, etiam spicarum numero.[1]

It will at once be noted that Haller did not accept Scheuchzer's *Cyperoides alpinum tenuifolium* as identical with his plant; therefore that can be ruled out. Haller's Swiss plant was, however, a species with culms and leaves *not scabrous* (non asper, ut neque folia), the scales of the spike with pale midrib (linea flava divisae) and the perigynia long-beaked (mucrone longiusculo). It obviously had nothing to do with *C. alpina* Swartz.

Although Haller specially pointed out that his no. 1356 was not the plant illustrated in Scheuchzer's t. 11, fig. 8, Oeder erroneously identified it with his Scandinavian specimen and Gunnerus followed Oeder. Scheuchzer's drawing was very crude, but his description extremely detailed: a loosely stoloniferous plant, the scales with a slender and pale midrib; obviously not *C. alpina* Swartz. Without attempting to identify either the plant of Haller or of Scheuchzer, problems which can best be dealt with in Europe, it is sufficient for the present study to reinstate for the circumpolar plant which has erroneously passed as *C. Halleri* the proper name, *C. alpina* Swartz.

[1] Haller, Hist. Stirp. Indig. Helv. ii. 184 (1768).

In North America *Carex alpina* is represented by three strongly marked geographic varieties. See Plate 248, figs. 1–10 and map 21. Since the map was made Dr. Malte has kindly sent me the material in the Canadian National Herbarium. Dr. Malte's personal collections show *C. alpina*, var. *typica* from several additional stations on Hudson Strait and the northern coast of Hudson Bay.



Map 21. American Range of Carex alpina: var. typica, solid dots; var. inferalpina, circles; var. Stevenii, crosses.

C. alpina, var. **typica**. *C.alpina* Swartz in Liljeblad, Svensk. Fl. ed. 2: 26 (1798). *C. Vahlii* Schkuhr, Riedgr. i. 87, t. Gg, fig. 94 (1801).—Cespitose; the stiff culms 0.5–3 dm. high: perigynia trigonous-obovoid, abruptly short-beaked, 2–2.5 mm. long, becoming reddish or purplish in maturity, strongly granular-papillose, the tips not recurving.—Greenland and Baffin Island south to Straits of Belle Isle, Newfoundland; alpine regions of the Shickshock Mts., Quebec; and Hudson Bay, Manitoba. The following, not including many Greenland specimens, belong here. Baffin Island: Frobisher Bay, *C. S. Sewall*, no. 238 (in part). Labrador: on granitic rock, Ryan's Bay, *Woodworth*, nos. 102, 103; Okak, *Samuel Weitz;* Anatolak, *Sewall*, nos. 401, 403, 409; fresh marsh, upland terrace, Indian Harbor, *Bishop*, no. 151. Newfoundland: turfy slopes of slaty hills, Little Quirpon, *Fernald & Long*, no. 27,697; turfy hillsides and barrens, western side of Quirpon Island, *Wiegand, Gilbert & Hotchkiss*, no. 27,698; dry sterile meadow, head of Mauve Bay, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 27,701; turfy shore, Cape Onion, *Fernald*, no. 27,700; dry crests of trap cliffs, Anse aux Sauvages,

Fernald, Wiegand & Long, no. 27,699. QUEBEC: cold chimneys in the schists at about 900–1000 m. alt., south of Fernald Pass, Mt. Mattaouisse, Matane Co., *Fernald & Smith*, no. 25,550. KEEWATIN: Fullerton, *J. M. Macoun*, no. 79,025. MANITOBA: Churchill, *J. M. Macoun*, no. 79,049. FIGS. 1, 2, 6 and 7.

Some of the American material has the perigynia tighter than in much of the European and on account of this character I designated in the herbarium at Kew a collection from Okak (*Weitz*) as an undescribed species. The character breaks down in a large series and I am unable to separate the material from bleak or alpine habitats in northeastern America from European *C. alpina.* The plant of low altitudes across southern Canada, extending northwest to Mackenzie, Yukon and Alaska and south to Lake Superior, is var. *inferalpina* Wahlenb. Although recent European authors have largely ignored var. *inferalpina* and Kükenthal treats it only as a minor form, it is in North America a plant of moist wooded or bushy habitats in the Canadian forest region, with a range and with local habitats quite distinct from those of the arctic-alpine *C. alpina.* If treated as a species var. *inferalpina* would be *C. angarae* Steud. Syn. Cyp. 190 (1855), fide annotation by Kreczetowicz. This synonym should be noted as unintentionally omitted from the following paragraph.

Var. INFERALPINA Wahlenb. Fl. Lapp. 241 (1812). Forma *inferalpina* (Wahlenb.) Kükenth. in Engler, Pflanzenr. iv^{20}. 386 (1909).—Usually slender and soft, less cespitose, 1.5–5 dm. high; perigynia ellipsoid or ellipsoid-obovoid, more prolonged, 2.5–3.5 mm. long and tapering to the beak, in age with widely spreading to recurving tips, whitish, stramineous or pale-brown, less conspicuously granulose.—Southeastern Labrador Peninsula to Yukon and Alaska, south, chiefly in calcareous regions, in mossy woods and thickets or on shores, to northern New Brunswick, the Lake Superior region of Michigan and Minnesota, southern Manitoba, southern Alberta, Idaho and southern British Columbia. FIGS. 3, 4, 8 and 9.

Var. STEVENII Holm, Am. Journ. Sci. ser. 4, xvi. 21, 27 (1903).—Intermediate in appearance between the other two varieties; spikes more slender and elongate; perigynia as in var. *inferalpina* but less prolonged and not recurving at tip.—Mountains of Colorado and Utah. FIGS. 5 and 10.

(*To be continued*)

THE HABITAT OF ASTROPHYTUM ASTERIAS IN TEXAS

Elzada U. Clover

A short article published in this journal[1] reported *Astrophytum asterias* (Zucc.) Lemaire as occurring in the United States. Since that time the author has visited the locality in which it was found and studied the surroundings.

Very little is known concerning the habitat of this species in Mexico. In Texas the plant seems to be restricted to a limited area eight miles north of Rio Grande City, Starr County, and is undoubtedly indigenous since the region is uninhabited.

The geological formation here is known as the Reynosa, which is probably of Pliocene age. It consists of an intricate mixture of coarse and fine gravel cemented by a calcareous matrix and ranges in color from deep red and pink to gray or white. The plants usually occur on summits and sides of low red gravel hills and an occasional one may be found in the loose soil in shallow ravines. They are usually partially shaded by shrubs. The flat tops of the plants are on a level with the soil. This renders them extremely difficult to find, especially since a reddish dust often covers the surface. This cactus blossoms all summer and the pale yellow flowers with vivid red centers reveal the otherwise effectively hidden plants.

Astrophytum asterias resembles *Lophophora Williamsii* in its habit of growing in small groups. Sometimes solitary specimens are found, but more often they are grouped in numbers ranging from three to ten plants. Contrary to the Mexican report concerning plants associated with *Astrophytum asterias*, in Texas it is closely associated with several other species of cacti. A list of shrubs and cacti found in a typical area one hundred yards square is given below:

Cacti

Astrophytum asterias (Zucc.) Lemaire
Lophophora Williamsii (Lemaire) Coulter
Echinocereus enneacanthus Engelm.
Echinocereus perbellus Britton & Rose
Echinocereus pentalophus DC.
Coryphantha Runyonii Britton & Rose
Hamatocactus setispinus Engelm.
Escobaria Runyonii Britton & Rose
Neomammalaria multiceps (Salm-Dyck) Britton & Rose
Neomammalaria hemisphaerica (Engelm.) Britton & Rose

[1] Rhodora **34**: 227–228. 1932.

WILCOXIA POSELGERI (Lemaire) Britton & Rose	THELOCACTUS BICOLOR (Galeotti) B. & R.
ANCISTROCACTUS SCHEERII Salm-Dyck	OPUNTIA LEPTOCAULIS DC.
	OPUNTIA LINDHEIMERI Engelm.

SHRUBS

LEUCOPHYLLUM TEXANUM Benth.	KOEBERLINIA SPINOSA Zucc.
MIMOSA PALLIDA (Torr.) Planch.	KARWINSKIA HUMBOLDTIANA Zucc.
PROSOPIS JULIFLORA Swartz	YUCCA SP.

Until very recently this species of *Astrophytum* was unknown to the natives. The Mexicans now refer to it as "the other peyote." The cactus fanciers who do not learn the scientific names call it "sea urchin" or "star cactus," and some confuse it with *Lophophora Williamsii* (peyote), and think that it is the sacred cactus of the Indians.

This cactus is accustomed to adverse conditions since the average rainfall is 12 to 14 inches. However, it thrives in cultivation and responds well if placed in somewhat shaded surroundings and given more moisture than its native habitat affords. Some specimens in gardens of the Lower Rio Grande Valley have attained a diameter of seven inches.

The reader may think it strange that a species of cactus within eight miles of a large town was not found sooner. The territory north of Rio Grande City is a rather desolate hilly region covered with brush, and until recently was seldom visited by anyone except cow boys or deer hunters. Since oil has been discovered and several wells drilled, hundreds of spectators have flocked to the oil field, and among them people interested in collecting native cacti either for themselves or for commercial purposes. This inconspicuous plant has now become locally well known, and today rock-garden enthusiasts and dealers in cacti are roaming the red gravel hills, seemingly bent on exterminating this rare and unassuming species as effectively as our forefathers did the passenger pigeon and the American bison. The fact that *Astrophytum asterias* is so difficult to locate may be the means of prolonging its existence until the collecting craze is over.

DEPARTMENT OF BOTANY,
University of Michigan.

A NOTE ON GLYCERIA NEOGAEA STEUDEL.—While studying grasses at George Washington University the writer had occasion to read the following description of Steudel (Syn. Pl. Glum. **1**: 285. 1854):

G. NEOGAEA. *Steud.* Radice fibrosa subrepente; culmo erecto tenero (pedali et ultra) foliato glabro; foliis planis vel subconvolutis angustissimis (3–5″ longis, ½–¾‴ latis) cum vaginis laevibus glabris; panicula angusta demum patente laxa; radiis binis vel solitariis alternis capillaribus simplicibus vel divisis; spiculis brevi-pedicellatis glabris 3–5-floris; glumis parvis inaequalibus apice margine scariosis pellucidis, valvula inferiore ovata obtusa margine scariosa, demum bifida dorso exarate 5–7-nervia. Terra nova.

This description agrees very well with specimens of *G. Fernaldii*, which has been collected in Newfoundland. Steudel's name has long priority over *Glyceria pallida* var. *Fernaldii* Hitchc., Rhodora **8**: 211. 1906 (*Glyceria Fernaldii* (Hitchc.) St. John, Rhodora **19**: 76. 1917) and apparently is the proper appellation for that segregate. Dr. A. S. Hitchcock has kindly examined the material and concurs in this opinion.—Leon Kelso, U. S. Biological Survey, Washington, D. C.

Wolffiella lingulata in Louisiana.—Dr. H. C. Oberholser, the well known ornithologist, has recently sent me for identification specimens of a small water plant which he collected on 28 December 1932 at Avery Island, Louisiana, where it was floating in abundance on the water of a marsh. It turns out to be *Wolffiella lingulata* Hegelm., described from Mexico and hitherto known in the United States only from California, whence it was first recorded,[1] in C. H. Thompson's excellent monograph of the Lemnaceae of the United States, from irrigation canals of Kern County. In Abrams' Flora[2] it is recorded from San Mateo, Monterey, Kern, San Bernardino, and Orange Counties, California. The plant is a flattish, very thin, tongue-shaped frond, usually about 6 mm. long and 2 mm. wide, with an equilaterally triangular reproductive pouch at the base and a small stipe scar evident on the lower margin of the pouch to one side of the midline.—S. F. Blake, Bureau of Plant Industry, Washington, D. C.

[1] Thompson, Ann. Rep. Mo. Bot. Gard. **9**: 39. *pl. 4, f. C.* 1897.

[2] Abrams, Ill. Fl. Pacific States **1**: 349. *f. 853.* 1923. The illustration fails to show the stipe scar, the position of which is characteristic of the species.

Volume 35, no. 413, including pages 147–186 and 4 plates, was issued 5 May, 1933.

CAREX ALPINA: FIG. 1, inflorescence, × 3, from Switzerland; FIG. 6, perigynium, × 6; FIG. 2, inflorescence, × 3, from Newfoundland; FIG. 7, perigynium, × 6.

C. ALPINA, var. INFERALPINA: FIG. 3, inflorescence, × 3, from Austria; FIG. 8, perigynium, × 6; FIG. 4, inflorescence, × 3, from Quebec; FIG. 9, perigynium, × 6.

C. ALPINA, var. STEVENII: FIG. 5, inflorescence, × 3, from Colorado; FIG. 10, perigynium, × 6.

C. VESICARIA, var. LAURENTIANA: FIG. 11, inflorescence, × 1, from Saguenay Co., Quebec; FIG. 12, inflorescence, × 1, from TYPE, Doctor Hill, Newfoundland.

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB

Conducted and published for the Club, by

MERRITT LYNDON FERNALD, Editor-in-Chief

JAMES FRANKLIN COLLINS
CHARLES ALFRED WEATHERBY } Associate Editors
LUDLOW GRISCOM

Vol. 35. July, 1933. No. 415.

CONTENTS:

New Ludvigia from New England. *E. H. Eames* 227
Recent Discoveries in the Newfoundland Flora (continued).
M. L. Fernald 230
Flora around Missisquoi Bay, Quebec. *C. H. Knowlton* 247
Notes from southeastern Wisconsin—II. *S. C. Wadmond* 252
Myriotrichia densa in New England. *R. E. Schuh* 256
Undescribed Mutisia from Ecuador. *S. K. Harris* 257
Slender-spiked Spartina pectinata. *M. L. Fernald* 258
Suppressed Plate in Eaton's Ferns. *R. D. Sanderson* 260
Notes on Flora of Haverhill, Mass. *S. K. Harris* 261
Rorippa amphibia in Androscoggin Co., Me. *A. H. Norton* 262

The New England Botanical Club, Inc.

8 and 10 West King St., Lancaster, Pa.

Room 1001, 53 State St., Boston, Mass.

RHODORA.—**A monthly journal of botany, devoted primarily to the flora of New England. Price, $2.00 per year, net, postpaid, in funds payable at par in United States currency in Boston; single copies (if available) 20 cents. Volumes 1–8 or some single numbers from them can be supplied only at advanced prices which will be furnished on application. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be considered for publication to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than two pages of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.**

Address manuscripts and proofs to

M. L. FERNALD, 14 Hawthorn Street, Cambridge, Mass.

Subscriptions (making *all remittances* **payable to RHODORA) to Ludlow Griscom, 8 W. King St., Lancaster, Pa., or Museum of Comparative Zoology, Cambridge, Mass.**

Entered at Lancaster, Pa. Post Office as Second Class Mail Matter.

INTELLIGENCER PRINTING COMPANY

Specialists in Scientific and Technical Publications

EIGHT WEST KING ST., LANCASTER, PA.

CARD-INDEX OF NEW GENERA, SPECIES AND VARIETIES OF AMERICAN PLANTS, 1885 TO DATE.

For American taxonomists and all students of American plants the most important supplement to the Index Kewensis, this catalogue in several ways exceeds the latter work in detail, since it lists not only the flowering plants, but ferns and other vascular cryptogams, and includes not merely genera and species, but likewise subspecies, varieties and forms. A work of reference invaluable for larger herbaria, leading libraries, academies of sciences, and other centers of botanical activity. Issued quarterly, at $22.50 per 1000 cards.

GRAY HERBARIUM of Harvard University, Cambridge, Mass., U. S. A.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. Day. Leatherette. Pocket size. Invaluable for collector's memoranda and herbarium records. Published and sold by the Gray Herbarium, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

MEMOIRS OF THE GRAY HERBARIUM. A series of illustrated quarto papers issued at irregular intervals, sold separately.

No. III. The Linear-leaved North American Species of Potamogeton, Section Axillares, by M. L. Fernald. 183 pp., 40 plates, 31 maps. 1932. $3.00.

Gray Herbarium of Harvard University, Cambridge, Mass.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3/4 in. 1 year $4.00, 6 months $2.50.

JUNCUS TRIGLUMIS: FIG. 1, habit, × 1, from the Tyrol; FIG. 2, fruiting glomerule, × 3, from western Siberia; FIG. 3, seeds, × 12, from Switzerland.

J. ALBESCENS: FIG. 4, habit, × 1, from Newfoundland; FIG. 5, fruiting glomerule, × 3; FIG. 6, seeds, × 12.

CYPRIPEDIUM PARVIFLORUM, var. PLANIPETALUM, × 1: FIG. 1, large plant from Old Port au Choix; FIG. 2, small plant from TYPE collection, Savage Cove, Newfoundland.

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 35. July, 1933. No. 415.

A NEW LUDVIGIA FROM NEW ENGLAND[1]

EDWIN H. EAMES

OUR common *Ludvigia palustris* (L.) Ell. is apparently so familiar and variable as to merit little consideration in the field. A plant of similar habit but with small oblanceolate leaves and hypanthia tapering to base on very short peduncles, was collected by me on the shore of West Pond, Guilford, Connecticut in 1928 and again in 1930; also a submerged form of peculiar characteristics.

In 1932 a good series was collected in several localities near the coast, extending its range eastward about 60 miles—almost to Narragansett Bay—which indicates probable reward for a search in southeastern Massachusetts.

With plenty of this material Mr. C. A. Weatherby, at the Gray Herbarium, readily placed these plants in the section of which the rare or local *Ludwigiantha brevipes* Long has been considered the northern representative, separated by floral characters from *L. arcuata* (Walt.) Small which has a range along the coast from "Va. to Fla."

The name *brevipes*, however, appropriate originally, for peduncles 5–12 mm. long, loses force now compared with the more northern stabilized endemic of the Coastal Plain, or adjacent foot-hills region, of southern New England, with peduncles 1–2 mm. long and other characters correlated or definite.

Associates at West Pond include *Ludvigia sphaerocarpa* Ell., once and long known as the only station in Connecticut, *Xyris Smalliana*

[1] Published with aid of a grant to RHODORA from the National Academy of Sciences.

Nash, *Juncus militaris* Bigel. and others of coastal plain affinities in this region.

Long's species seems to me more appropriate as

LUDVIGIA **brevipes** (Long), n. comb. (*Ludwigiantha brevipes* Long in Britt. and Br. Ill. Fl. ed. 2, ii: 586 (1913)):—Creeping, glabrous or rarely minutely recurved-puberulent on some upper parts and adjoining ovaries, branched, 1–3 dm. long; leaves many, opposite, oblong-oblanceolate, acutish (actually rounded at very apex), tapering basally to a narrow-margined short indeterminate petiole or sessile, 1–2.5 cm. long; *flowers* solitary in the axils, 12–13 mm. broad, on more or less slender erect to spreading peduncles 5–12 mm. long; in anthesis the hypanthium turbinate, 4-angled, 4–6 mm. long, about equalling the sepals, distinctly bibracteolate at base; sepals 4–6 mm. long, ovate-lanceolate to lanceolate, acute, spreading, persistent; petals yellow, fugacious, broad-elliptic, 4–6 mm. long, equalling sepals; stamens 1.5–2.5 mm. long (anthers .75 mm. long), falling early intact; style stouter, 1–2 mm. long, not persistent, surrounded by a 4-lobed stylopodium: capsule clavate, 8–10 mm. long, distinctly exceeding the spreading calyx, upcurved in its tapering lower third.—"Moist sand, Long Beach Island, Ocean County, N. J.," about 150 miles from the Connecticut coast.

LUDVIGIA **lacustris**, sp. nov., *L. brevipedi* similis, a qua differt floribus 5.5–6.5 mm. latis, pedunculis 1–2 (–2.5) mm. longis, hypanthio 2–3 mm. longo, sepalis ovatis deinde ovato-lanceolatis acutis ovarium aequantibus vel eo brevioribus 2.5–3 mm. longis 1.8–2.2 mm. latis, petalis elliptico-oblongis 1.3–2 (–3) mm. longis quam sepala brevioribus; staminibus 1.4–1.8 mm. longis (antheris .60 mm. longis), stylis 1.1–1.5 mm. longis, capsulis immaturis clavatis rectis vel vix curvatis.

Similar, differing in the *flowers* 5.5–6.5 mm. broad; peduncles 1–2 (–2.5) mm. long; hypanthium 2–3 mm. long; sepals ovate, soon ovate-lanceolate, acute, shorter than or equalling ovary, 2.5–3.0 x 1.8–2.2 mm.; petals elliptic-oblong, 1.3–2 (–3) mm. long, much shorter than sepals; stamens 1.4–1.8 mm. long (anthers .60 mm. long); styles 1.1–1.5 mm. long; capsules clavate, straight or nearly so (but not seen at full maturity).—Wet or moist open shores and in shallow water. CONNECTICUT; New Haven County; Guilford, several collections at West Pond; New London County; Old Lyme, mill-pond at Laysville, shores of stream below dam at Rogers Lake, south end of Rogers Lake in sand and in crevices of retaining wall; Lyme, north end of Rogers Lake in 1–2.5 dm. water, more robust, green, much branched basally, stems ascending with tips emersed 1–1.5 dm. and flowering freely. RHODE ISLAND: Washington County; Charlestown, in moist pure sand on long-emersed beach at Watchaug Pond, 12 Sept. 1932, Eames no. 11,498 (TYPE in Herb. Gray).

The type, like most other individuals of similar habitat, has purplish leaves but is unusual in their profusion, even imbricate with recurved

petioles, the main branches all basal and frequently curved laterally, the internodes very short, 2–6 mm. next to the flowers. The most robust plants, from Lyme, were particularly favored by warm water and a heavy stratum of decaying vegetation over sand. In these the internodes were up to 10 or finally even 18 mm. long, the flowers wide open in and mostly facing bright sunshine. After flowering the sepals and ovary grow a little longer and, unless fertilized (which is rarely, or late), become yellow, contract and drop off with sepals expanded. The very short peduncles sometimes upcurve 90° to bring the flowers of prostrate plants square to the zenith.

A form of deep water was a surprise from the first, is markedly different in habit, texture and appearance and is here named

Ludvigia lacustris forma **aquatilis** f. nov., submersa, erecta, simplex vel valde ramosa, 4–10 dm. alta; foliis multis membranaceis lineari-lanceolatis sessilibus subacutis 15–35 (–45) mm. longis, 2.5–6 mm. latis.

Submersed, erect, simple to much branched, 4–10 dm. tall; internodes short; leaves many, membranous, linear-lanceolate, sessile, acutish, 15–35 (–45) x 2.5–6 mm. Connecticut: New Haven County; N. Branford, in Little West Pond; Guilford, West Pond, Eames no. 11,475 (type in Herb. Gray): New London County; Old Lyme, in a millpond at Laysville and in Rogers Lake. Rhode Island: Washington County, cast up on shore of Worden's Pond, South Kingston. Usually in deep water—sometimes 2.5 m.—sterile, sometimes in profusion as if from widely creeping rootstocks, or solitary and simple or nearly so. Easily broken in rough water and sometimes washed ashore in quantities.

Allied in habit to the preceding form is a plant long known to me in my home range, now named

Ludvigia palustris (L.) Ell., f. **submersa** (Glück), n. comb. *Isnardia palustris*, f. *submersa* Glück, Syst. & Morph. Untersuchungen über Wasser und Sumpfgewächse, iii. 155 (1911). Submersed, erect or ascending, simple to much branching, 3–8 dm. tall; leaves membranous, broad-ovate, distinctly petioled, obtuse. Widely distributed in range of type. A plant from a mill-pond in Old Lyme, where locally plentiful, no. 11,507, Eames, may be cited as representative.

Usually in deep water, sterile. The coarse branched form with its larger leaves 4–5 cm. long, including petiole and to 2 cm. broad, the tapered base often more abrupt than apex. The simple or little-branched very slender form appears to be singularly solitary as a rule, in ponds with a weedy bottom and shooting far above most

other submersed plants, has much smaller pale green leaves is rather rare but occurs at all altitudes in eastern New York, Connecticut and in Winchester (Wincheck) Pond, Hopkinton, Rhode Island.

Bridgeport, Connecticut.

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. Fernald

(*Continued from page 223*)

C. stylosa C. A. Meyer. Additional stations from Highlands of St. John: peat on quartzite slopes, head of Deep Gulch, Doctor Hill, *Fernald, Long & Fogg*, no. 1441. Bonne Bay: peaty or turfy upper quartzite slopes (alt. 600–650 m.), Killdevil, no. 1442.

*C. salina Wahlenb., var. pseudofilipendula Kükenth. Bonne Bay: alluvial islands and shores at mouth of Main River, *Fernald, Long & Fogg*, no. 1449.

In Rhodora, xxviii. 166 (1926), I recorded this variety from Newfoundland on the strength of a collection which closely matches Scandinavian material of Kükenthal's hybrid of it with *C. aquatilis*. The Main River material seems to be the pure variety.

C. crinita Lam. Typical *C. crinita* is not common in Newfoundland. The northernmost station on the West Coast is on Bay of Islands: mossy spruce woods and thickets, Lark Harbor, *Fernald, Long & Fogg*, no. 144.

C. lasiocarpa Ehrh. The northernmost known Newfoundland station is on St. John Bay: wet bog back of Eddy's (or Old Man's) Cove, *Fernald, Long & Fogg*, no. 1452.

C. Hostiana DC., var. laurentiana Fern. & Wieg., Rhodora, xxvi. 122 (1924). The most extensive development of the variety yet known is on Bonne Bay: dominant on gravelly shore and alluvial islands near mouth of Main River, *Fernald, Long & Fogg*, no. 1454. Accompanied by an abundant hybrid:

* × C. **xanthina**, hybr. nov. (*C. flava* × *C. Hostiana* var. *laurentiana*). × *C. xanthocarpae* Degl. (*C. flava* × *Hostiana*) similis, omnibus partibus majoribus; culmis 7–8 dm. altis supra scabris; foliis 3–4 mm. latis; spicis femineis 1.2–2 cm. longis 7–10 mm. crasiis, imis 3–11 cm. distantibus; periginiis ovatis inflatis 4–5 mm. longis longe rostratis, valde costatis.—Newfoundland: several large clumps with the abundant parents on gravelly shores and alluvial islands near mouth of Main River, Bonne Bay, August 27, 1929, *Fernald, Long & Fogg*, no. 1455 (type in Gray Herb.).

× *C. xanthina* clearly combines the characters of its parents and is quite sterile. It strongly simulates × *C. xanthocarpa* (× *C. fulva*

Hoppe, not Good.) of Europe, a frequent hybrid there between *C. flava* and typical *C. Hostiana.* Another hybrid of *C. Hostiana,* var. *laurentiana,* abundant at the type-locality is

* × C. **pseudo-fulva**, hybr. nov. (*C. Hostiana,* var. *laurentiana* × *lepidocarpa*). × *C. xanthinae* similis; culmis apice leviusculis; spicis femineis imis 1–6 cm. distantibus.—NEWFOUNDLAND: abundant with the parents, wet runs and boggy spots in limestone barrens, upper slopes and tablelands, alt. 200–300 m., Table Mt., Port au Port Bay, August 16, 1910, *Fernald, Wiegand & Kittredge,* no. 4258 (TYPE in Gray Herb.)

Very similar to × *C. Leutzii* Kneucker (*C. Hostiana* × *lepidocarpa*), a frequent European hybrid, but larger in all parts.

* × C. PIEPERIANA P. Junge. (*C. flava* × *lepidocarpa*). With the parents at peaty margin of spring-rill in spruce swamp, Brig Bay, *Fernald, Long & Dunbar,* no. 26,434.

* × C. **subviridula** (Kükenth.), comb. nov. *C. flava* × *Oederi,* forma *subviridula* Kükenth. in Engler, Pflanzenr. IV[20]. 678 (1909). *C. flava* × *Oederi,* var. *pumila* (*Oederi,* var. *viridula*). One of the commoner hybrids of Newfoundland. VALLEY OF THE EXPLOITS: ledges and talus, Grand Falls, *Fernald, Wiegand, Bartram & Darlington,* no. 4987; sandy shore, Buchan Junction, July 9, 1930, *K. P. Jansson.* ST. JOHN BAY: pools back of beach, Bard Harbor, *Wiegand, Gilbert & Hotchkiss,* no. 27,744. BONNE BAY: swales on alluvial islands and shores at mouth of Main River, *Fernald, Long & Fogg,* no. 1464.

C. CRYPTOLEPIS Mackenz. Common in southern and central Newfoundland, its northern limits seem to be on BAY OF ISLANDS: peaty and gravelly thickets, French (or Tweed) Island, *Fernald, Long & Fogg,* no. 149; and on NOTRE DAME BAY: gravelly pond-shores, Lewisport, *Fernald, Wiegand & Darlington,* no. 4982.

C. OEDERI Retz., var. PUMILA (Coss. & Germ.) Fern., RHODORA, viii. 201 (1906). *C. viridula* Michx. Fl. Bor.-Am. ii. 170 (1803). *C. flava,* var. *pumila* Coss. & Germ. Fl. Par. 602 (1845). *C. flava,* var. *viridula* (Michx.) Bailey, Mem. Torr. Bot. Cl. i. 31 (1889). *C. Oederi,* var. *viridula* (Michx.) Kükenth. in Engler, Pflanzenr. iv. 20 (1909).

Kükenthal does not cite, even in synonymy, either *C. flava* var. *pumila* Coss. & Germ or *C. Oederi,* var. *pumila;* and he treats *C. Oederi,* var. *viridula* as strictly North American and eastern Asiatic. Nevertheless, I still find myself as unable as I was in 1906 to see wherein the small states of *C. viridula* Michx. differ from authentic material of Cosson & Germain's *C. flava,* var. *pumila.* The account by Cosson & Germain was clear:

var. γ. *pumila.* (C. OEderi. Ehrh. calam. n. 79.—Host, Gram. I. t. 65.)—Tiges de 5–15 centimètr. Epis femelles, sessiles, rapprochés-

agglomérés. Utricules très petits, terminés par un bec court droit.—*A. C.* Marais desséchés, bords des mares et des étangs, surtout des terrains sablonneux.—Bords de la Seine! St-Léger! Senart! Fontainebleau!, etc.

Although Cosson & Germain cited as a synonym *C. Oederi* of Ehrhart and of Host, their variety rests primarily upon the plant described from the "Environs de Paris." An authentic specimen in the Gray Herbarium collected by Cosson near Paris, "In paludosis pr. St. Hubert (Seine et Oise)," seems to me quite inseparable from the American *C. viridula* Michx.

C. MICROGLOCHIN Wahlenb. A slight extension southward to INGORNACHOIX BAY: peaty and marly borders of shallow ponds in limestone barrens, Old Port au Choix and Pointe Riche, *Fernald, Long & Fogg*, nos. 1465, 1466.

C. VESICARIA L., var. JEJUNA Fern. A considerable northern extension to HIGHLANDS OF ST. JOHN: dry meadow on tableland of Doctor Hill, *Fernald, Long & Fogg*, no. 1473.

CAREX VESICARIA L., var. **laurentiana**, n. var. (TAB. 248, FIGS. 11 and 12), var. *monilem* simulans; spicis foemineis cylindricis 1–3.5 cm. longis 7–12 mm. crassis; squamis ovato-lanceolatis attenuatis plus minusve purpureo-castaneis 5–7 mm. longis perigyniis subaequantibus; spicis masculis 1 vel 2.—Western Newfoundland, Saguenay County and Magdalen Islands, Quebec and southern New Brunswick. NEWFOUNDLAND: dry meadow on tableland of Doctor Hill, Highlands of St. John, July 31, 1929, *Fernald, Long & Fogg*, no. 1474 (TYPE in Gray Herb.). QUEBEC: swale, St. Paul, Chevalier, Saguenay Co., July 26, 1915, *St. John*, no. 90,279; grassy shore, Romaine, Lagorgendière, Saguenay Co., August 31, 1915, *St. John*, no. 90,225; platières de sable, Rivière Mingan, Saguenay Co., 26 juillet, 1926, *Victorin & Rolland*, no. 24,511. MAGDALEN ISLANDS: lieux humides, Ile du Bassin, 15 juillet, 1919, *Victorin & Rolland*, no. 9230. NEW BRUNSWICK: Grand Manan Island, 1861, *J. T. Rothrock*.

In the type-collection of *C. vesicaria*, var. *laurentiana* the culms are only 2–3.5 dm. high, but in specimens from lower altitudes they may reach a height of 8 dm. In its very long and broad usually dark-purple scales var. *laurentiana* is conspicuously different from typical *C. vesicaria* and its described varieties, in which the scales, although sometimes dark, are conspicuously shorter than the perigynia. The variety is apparently local, or perhaps of more northern range than we yet know. Its occurrence on the high tableland of Doctor Hill in Newfoundland and its range westward on the southern margin of the Labrador Peninsula, as well as its stations on the Magdalen Islands and upon bleak Grand Manan (in the mouth of the Bay of Fundy)

suggest that at these stations it is possibly reaching southern limits from a broader northern range.

The occurrence on Grand Manan or on the headlands about the Bay of Fundy or on the outer coast of Maine of plants characteristic of the bleaker regions of the Gulf of St. Lawrence but elsewhere rare or wanting in the Maritime Provinces is well known: *Draba stylaris* J. Gay, *Saxifraga Aizoon* Jacq., *Potentilla pectinata* Raf., *Loiseleuria procumbens* (L.) Desv., *Primula laurentiana* Fernald, *Senecio Pseudo-Arnica* Less. and at least 20 other species. It is, therefore, of special interest that *Carex vesicaria*, var. *laurentiana* should have been found on Grand Manan.

JUNCUS GERARDI Loisel. Extended north to BONNE BAY: brackish tidal mud-flats at mouth of Main River, *Fernald, Long & Fogg*, no. 1480.

J. DUDLEYI Wiegand. In Newfoundland known only near the West Coast. BONNE BAY: alluvial islands and shores at mouth of Main River, *Fernald, Long & Fogg*, no. 1482. BAY OF ISLANDS: marsh near mouth of Hugh's Brook, *Fernald & Wiegand*, no. 2988; wet clay slopes above the beach, Governor Island, *Fernald, Long & Fogg*, no. 164.

J. EFFUSUS L., var. COMPACTUS Lej. & Court. Extended north to BONNE BAY: open upland marsh, Bonne Bay, *Harlow Bishop*, no. 184; serpentine mud and gravel by Winterhouse Brook, *Fernald, Long & Fogg*, no. 1483.

J. EFFUSUS, var. CONGLOMERATUS (L.) Engelm. *J. conglomeratus* L. See Fernald & Wiegand, RHODORA, xii. 85 (1910). Heretofore known in Newfoundland only from the eastern and southeastern districts, but now found on BAY OF ISLANDS: dominant on sphagnous marsh, Lark Harbor, *Fernald, Long & Fogg*, no. 167.

JUNCUS CANADENSIS J. Gay, var. SPARSIFLORUS Fernald, RHODORA, xxiii. 241 (1921). All the Newfoundland material of *Juncus canadensis* belongs to var. *sparsiflorus*, the Nova Scotian variety with large flowers. In Newfoundland, the mature perianth ranges from 3.8–4.6 mm. long, rather longer than in Nova Scotia. The variety is common in wet peat in southern Newfoundland. Its most northern stations, as shown by our collections, are in the valley of the Exploits and about Bonne Bay.

J. NODOSUS L. Extended north to BONNE BAY: wet limy peat bordering pond, Storehouse Cove, *Fernald, Long & Fogg*, no. 1489; gravel along Deer Brook, no. 1490.

J. ALPINUS Vill. and var. RARIFLORUS Hartm.

As noted on p. 84, I find myself unable to follow the extreme segregations of *Juncus alpinus* recently proposed in Europe. My friend, Mr. H. W. Pugsley, describes as a new species *J. Marshallii* Pugsley,

Journ. Bot. 282, with fig. (1931), from Ross-shire in Scotland and from Flower Cove, Newfoundland (*Fernald*, no. 27,780). To me 27,780 is merely an undeveloped state of the common Newfoundland plant, *J. alpinus*, var. *rariflorus* Hartm. (var. *insignis* Fries). In this, the original identification, Dr. Lindquist coincides, saying in his important study, *Taxonomical remarks on Juncus alpinus Villars and some related species*,[1] where he reduces the Ross-shire plant to varietal rank, *J. alpinus*, var. *Marshallii* (Pugsley) Lindquist, "It may be remarked that I cannot accept the specimen no. 27780 collected in Newfoundland by Fernald and referred to by Pugsley as belonging to this type."[2]

The Newfoundland material of *Juncus alpinus* falls into two well-defined, though confluent, extremes: true *J. alpinus* with the flowers all sessile or nearly sessile in dense heads, and var. *rariflorus* (= var. *insignis*) with some of them elevated above the others on elongate pedicels. The latter has often been treated as a species, *J. nodulosus* Wahlenb., but so many transitions occur that I have been unable to view the two as specifically separable. It is, therefore, gratifying to find Lindquist, likewise, treating it as a variety. Both *J. alpinus* (typical) and *J. alpinus*, var. *rariflorus* vary greatly in size and number of heads, and very dwarf colonies or selected individuals (with only 1 or 2 heads) may be artificially separated off. They are, however, at best minor forms. Var. *rariflorus* may be either dark- or light-colored. The important bibliography is given by Lindquist, though he seems to err in citing var. *rariflorus* as of "(E. Fries) C. J. Hartman." The name *rariflorus* started as *J. rariflorus* Hartm. (1820), becoming *J. nodulosus β. rariflorus* (Hartm.) Fries in 1828 and *J. alpinus β. rariflorus* Hartman—or (Hartm.) Hartm. if wished—in 1849.

Dr. T. A. Sprague, Journ. Bot. lxvi. 210 (1928), urges the taking up of *Juncus alpino-articulatus* Chaix, a name published in the general introductory matter in the 1st volume (1786) of Villars' *Histoire des Plantes de Dauphiné*, but rejected by Villars himself in the main body of his flora, Hist. ii. 233 (1787), where *J. alpinus* was published. Lindquist, however, believes, since *J. alpino-articulatus* rested only on a pre-Linnean diagnosis by Haller, which might just as well have been based on a quite different species from *J. alpinus* Vill., that it is wholly unwise to discard the definite *J. alpinus* for the wholly indefin-

[1] Lindquist, Botaniska Notiser (1932), 313–372 (1932).
[2] Lindquist, l. c. 342 (1932).

ite *J. alpino-articulatus.* Stability of nomenclature and avoidance of error are best maintained by holding to *J. alpinus.*

The other argument against taking up the name *J. alpino-articulatus* is the very practical one, certainly intended by the provision of the International Rules, that a name should be excluded when it is "a permanent source of confusion or error." Sprague argues that the ill-begotten *J. alpino-articulatus* would not be such a source of trouble:

It has been suggested to the writer that the name *Juncus alpino-articulatus* Chaix should be rejected under Art. 51, 4°, on the ground that it might be mistaken for a hybrid between *Juncus alpinus* and *J. articulatus* by those who were unfamiliar with the details of its publication. This suggestion appears to be unfounded: as soon as *J. alpinus* is treated as a synonym of *J. alpino-articulatus* in the principal Floras, such confusion—if it ever arose—would disappear. Hence the name *Juncus alpino-articulatus* cannot be a *permanent* cause of confusion or error, and should be adopted under International Rules.

Surely, if it be urged that *Juncus alpino-articulatus* should be maintained, in spite of *J. articulatus* L. (1753), then, similarly, *Asplenium Trichomanes-ramosum* L. (1753) must be maintained (see foot-note on p. 47) over the perfectly clear and universally used *A. viride* Hudson (1762). Botanical nomenclature at best is difficult: let us keep it clear where we can. Clarity demands the use of *Juncus alpinus* and of *Asplenium viride.*

* × J. **alpiniformis**, hybr. nov. *J. alpinus* × *articulatus* (*J. lampocarpus* Ehrh.). *J. alpino* similis; petalis attenuatis; seminibus abortivis.—NEWFOUNDLAND: abundant, with typical and fertile *J. alpinus* Vill. and *J. articulatus* L. in wet limy peat, bordering pond, Storehouse Cove, Bonne Bay, August 9, 1929, *Fernald, Long & Fogg,* no. 1501 (TYPE in Gray Herb.).

Strongly resembling typical *J. alpinus,* but with the narrow and attenuate petals of *J. articulatus.* Abundant but all sterile. As stated, in discussions under abundant hybrids of *Carex,* it is far more convenient to have a properly published binomial for hybrids of some abundance than to have to designate, at each reference to them, the long hybrid formula. In the present instance, the existence of the confusing name *J. alpino-articulatus* Chaix (discussed above) makes it doubly desirable that the hybrid *J. alpinus* × *articulatus* should have a distinctive name; otherwise we should have confusion worse confounded!

* × J. **nodosiformis,** nom. nov. *J. alpinus* × *nodosus* Buchenau in Engler, Pflanzenr. iv [36]. 216 (1906). BONNE BAY: very abundant and sterile, with the two fertile parents, wet limy peat bordering Store-

house Cove, *Fernald, Long & Fogg*, no. 1491. BAY OF ISLANDS: wet place, Birchy Cove (Curling), *Waghorne*, no. 56.

Quite like the type of Buchenau's hybrid, from Gaspé Co., Quebec; strongly simulating typical *J. alpinus* but more slender and with the very slender and freely creeping rhizome of *J. nodosus;* the sterile heads smaller and more numerous than in *J. nodosus* of the region. × *J. nodosiformis* is superficially very similar to the European *J. anceps* Laharpe, but it can hardly be referred to that species.

*J. ARTICULATUS L., var. OBTUSATUS Engelm. BONNE BAY: alluvial islands and shores at mouth of Main River, *Fernald, Long & Fogg*, nos. 1499, 1500.

* × J. **fulvescens**, nom. nov. *J. articulatus* × *brevicaudatus* Fern. & Wieg., RHODORA, xii. 137 (1910). In southern Newfoundland, Nova Scotia and southeastern Maine very abundant, often forming extensive areas of thousands of sterile plants combining the characters of the two fertile parents. In some of these areas the infertile hybrid is far more abundant than the fertile parents, indicating that a classification which places *J. articulatus* and *J. brevicaudatus* in different sections (20 sections apart in Buchenau's treatment) is at least artificial. The following are the collections at hand of × *J. fulvescens*. NEWFOUNDLAND: springy swales among spruce thickets, Bay Bulls, *Fernald, Long & Dunbar*, no. 26,491; Murray's Pond, near St. John's, 1928, *A. M. Ayre;* springy ditch, Grand Falls, *Fernald, Wiegand & Darlington*, no. 5127; wet thickets along river, Grand Falls, no. 5128; boggy pond-margins back of Birchy Cove (Curling), *Fernald, Wiegand & Kittredge*, no. 3012; springy spots, Birchy Cove (Curling), no. 3014; ditch in gravelly thickets along Harry's River, *Fernald & Wiegand*, no. 3013. PRINCE EDWARD ISLAND: shallow pools and small ponds, Tignish, *Fernald, Long & St. John*, no. 7182. NOVA SCOTIA: Louisburg, *J. Macoun*, no. 20,720; brackish gravelly shore of Lahave River, Bridgewater, *Fernald & Long*, no. 23,619; wet savannahs along Little River, east of Tiddville, *Fernald & Long*, no. 20,690; wet peaty swale, Yarmouth, *Fernald & Graves*, no. 20,688; boggy swale, Yarmouth, *Fernald, Long & Linder*, no. 20,692. MAINE: wet mossy spot on Charlotte Road, Pembroke, *Fernald* (*& Wiegand*), no. 1588 (TYPE in Gray Herb.).

J. ALBESCENS (Lange) Fern. RHODORA, xxvi. 202 (1925). Apparently general on the West Coast, wherever the limestone barrens or limy talus prevail.

Since *Juncus albescens* has only recently been segregated from the Eurasian *J. triglumis* L. and since it has not been wholly accepted by European botanists[1] who have not been familiar with it, it is desirable to illustrate the two species side-by-side (PLATE 249).

[1] For instance, my friend, the late Dr. Ostenfeld, who enumerates for Greenland only *J. triglumis.*—*The Flora of Greenl. and its Origin*, Kgl. Danske Videnskab. Selskab. Biol. Meddel. vi. no. 3: 68 (1926)

LUZULA CAMPESTRIS (L.) DC., var. ACADIENSIS Fern., RHODORA, xix. 38 (1917). Already reported by Mrs. Kennedy (RHODORA, xxxiii. 207). Besides her stations the following may be recorded. AVALON PENINSULA: woods near Murray's Pond, 1931, *A. M. Ayre*. VALLEY OF THE EXPLOITS: damp thickets and open woods, Grand Falls, *Fernald, Wiegand, Bartram & Darlington*, nos. 5155, 5157. ST.-PIERRE ET MIQUELON: lieux humides ou secs, bois, plaines, Cap à l'Aigle, St.-Pierre, *Arsène*, no. 159.

*L. CAMPESTRIS, var. ALPINA Gaud. *L. sudetica* (Willd.) DC. BONNE BAY: shelves and talus of diorite cliffs, Western Head, *Fernald, Long & Fogg*, no. 1512.

An arctic and subarctic variety (or species) otherwise known south of northern Labrador only on subalpine meadows of the Shickshock Mts., Gaspé.

STREPTOPUS OREOPOLUS Fern. Add to the records from HIGHLANDS OF ST. JOHN: peaty quartzite slopes, Deep Gulch, Doctor Hill, *Fernald, Long & Fogg*, no. 1525.

TRILLIUM CERNUUM L. Range extended north to BONNE BAY: alluvial woods and thickets near mouth of Main River, *Fernald & Long*, no. 1527.

CYPRIPEDIUM PARVIFLORUM Salisb., var. PLANIPETALUM Fern. RHODORA, xxviii. 168 (1926).

Since the very characteristic western Newfoundland extreme has not been illustrated it is desirable to show characteristic specimens (PLATE 250). I am unable to treat the plant as a species, *C. planipetalum* (Fern.) F. Morris in Morris & Eames, Our Wild Orchids, 8, 11 (1929), a treatment only inadvertently (apparently) subscribed to by Mr. Morris, who, in discussing the plant, calls it a variety.

C. ACAULE Ait. The northern limit in Newfoundland is apparently on BONNE BAY: turfy and bushy patches on quartzite slope of Killdevil, *Fernald, Long & Fogg*, no. 1536.

HABENARIA STRAMINEA Fern. RHODORA, xxviii. 175 (1926). Extended south to ST. JOHN BAY and INGORNACHOIX BAY: peaty turf on limestone barrens northeast of Old Port au Choix, *Fernald, Long & Fogg*, no. 1541; turfy limestone barrens back of Crow's Head, no. 1542; turfy and peaty knolls bordering limestone barrens, Eastern Point, no. 1544; heathy carpets of *Cladonia, Empetrum*, etc., at upper borders of depressions in limestone barrens, Pointe Riche, no. 1543.

Mr. Frank Morris doubts the specific distinctness of *Habenaria straminea*, treating it as *H. albida*, var. *straminea* (Fern.) F. Morris in

Morris & Eames, Our Wild Orchids, 69, plates 23 and 24 (1929).[1] This is, of course, a matter of judgment; but if *H. dilatata* (Pursh) Hook. is kept apart from *H. hyperborea* (L.) R. Br., *H. straminea*, with as strong morphological characters and with a very distinct range, is surely a good species. If *H. straminea*, occurring wholly outside the range of *H. albida* (European), is only a variety, what possible basis is there for maintaining as species *H. macrophylla* Goldie, *H. blephariglottis* (Willd.) Hook. and *H. fimbriata* (Ait.) R. Br., species without strong morphological characters and all occurring, in a broad sense, in essentially the same ranges as their paired but earlier-published species, *H. orbiculata* (Pursh) Torr., *H. ciliaris* (L.) R. Br. and *H. psycodes* (L.) Spreng., respectively? The most conservative students, however, such as Ames (Orchidaceae, fasc. iv. and Enum. Orchids U. S. and Can.), maintain *H. dilatata, macrophylla, blephariglottis* and *fimbriata* as species.

The differences originally pointed out are maintained in the new material of *H. straminea* as well as in a series just received from Greenland: the generally greater size and thicker spike; usually longer bracts; narrower and thinner stramineous sepals, with more evident nerves; longer, thinner and definitely nerved petals; longer and thinner, clearly nerved lip; and usually longer spur. Mr. Morris's photographs well bring out the habitat: pl. 23 with *Salix vestita* Pursh and *Empetrum nigrum* L. dominant, pl. 24 with *Myrica Gale* L. dominant and *Rubus acaulis* Michx. and *Sanguisorba canadensis* apparent; but details of the flowers have not heretofore been shown. Dr. Raup and I have, therefore, photographed dried flowers (just as removed from the herbarium-specimens) of both *H. straminea* and the European *H. albida* (PLATE 251).

Habenaria straminea is certainly the Greenland and Newfoundland representative of the European *H. albida*. Whether it is a species or a strongly marked geographic variety is of minor importance as compared with the greater significance of the geographic relationship. As already stated, if it be treated merely as a variety, that status should also be given *H. dilatata;* while *H. macrophylla* and *H. fimbriata*

[1] The authorship of the combination is here ascribed to Morris since, in the preface to the book, specific reference is made to the fact that "the Eames plan of a camera record was wedded to the Morris practice of an author's pen," from which it has been inferred (in the Gray Herb. Card Index and elsewhere) that Morris was responsible for the text. This interpretation is supported by a letter from Mr. Morris, under date of January 7, 1930, with the statement: "The responsibility for the whole letterpress, as between Mr. Eames and me, is mine and undivided."

should be treated as forms (differing in size only) and *H. blephariglottis* as hardly more than a color-form. Personally I am not now prepared to follow such a course, any more than I am to merge *Habenaria* with *Orchis* or to split it into monotypic or ditypic genera!

HABENARIA HOOKERI Torr., var. **abbreviata**, n. var. (TAB. 252), omnibus partibus quam apud formam typicam brevior; foliis oblongo-obovatis vel suborbicularibus 2.5–7 cm. longis; scapis 7–18 cm. altis; spicis 2.5–9 cm. longis; sepalo dorsali late ovato obtuso apice vix prolongato 5–7 mm. longo, sepalis lateralibus divergentibus 6–8.5 mm. longis; petalis erectis 5–7 mm. longis; labello 6–10 mm. longo deltoideo-lanceolato apice plerumque rotundato vix prolongato; calcare 9–13 mm. longo; capsulis 9–14 cm. longis.—Northwestern NEWFOUNDLAND, on limestone barrens bordering St. John Bay and Ingornachoix Bay: with *Empetrum nigrum, Vaccinium uliginosum* var. *alpinum*, etc. in peaty turf on limestone barrens, Old Port au Choix, July 21, 1929, *Fernald, Long & Fogg*, no. 1549; with *Empetrum nigrum* and *Juniperus communis* var. *montana* on peaty knolls in limestone barrens, Old Port au Choix, July 22, 1929, *Fernald, Long & Fogg*, no. 1550; with *Empetrum nigrum, Juniperus communis* var. *montana*, etc. on dry peaty knolls in limestone barrens back of Crow's Head, St. John Bay, July 23, 1929, *Fernald, Long & Fogg*, no. 1551; peaty knolls on limestone barrens, Pointe Riche, July 24, 1929, *Fernald, Long & Fogg*, no. 1552; turfy and peaty knolls bordering limestone barrens, Eastern Point, St. John Bay, July 25, 1929, *Fernald, Long & Fogg*, no. 1553 (TYPE in Gray Herb.).

Habenaria Hookeri var. *abbreviata* (PLATE 252, habit and upper insert) differs from typical continental American *H. Hookeri* (lower insert) in its shorter dimensions in every part, in the yellower color of its flowers, in the blunter upper sepal which shows only a slight tendency to the prolonged tip so often seen in the continental plant, and in the more gradually narrowed lip. Its habitat, with arctic-alpine xerophytes on limestone gravel, is so unlike the conventional habitat, in acid woodland humus on the continent, that one would at first feel impelled to consider it a distinct species. It exhibits, however, no definite morphological characters by which it can be specifically separated, although it is as clearly segregated from *H. Hookeri* as is *H. macrophylla* from *H. orbiculata*, so-called species without marked geographic segregation.

As stated, the plant of the limestone barrens of northwestern Newfoundland differs from typical *Habenaria Hookeri* by its smaller size in all parts. These contrasts are brought out in the photographs made by Dr. Raup; and measurements taken from the 64 individuals

of var. *abbreviata* collected and from the 157 individuals of typical *H. Hookeri*, as represented in the Gray Herbarium and the herbarium of the New England Botanical Club (ranging from southeastern New Brunswick to central Maine and Montreal and west to southern Ontario, Michigan and Pennsylvania), give the following contrasts.

H. Hookeri (typical): leaves 5–16 cm. long; scape (including spike) 1.7–4.5 dm. high; spike 5–25 cm. long; upper sepal 7–11 mm. long; lateral sepals 8.5–11.5 mm. long; petals 6–9 mm. long; lip 9–13 mm. long; spur 1.4–2.6 cm. long; capsules 1.5–2.2 cm. long.

Var. abbreviata: leaves 2.5–9 cm. long; scape 0.7–1.8 dm. high; spike 2.5–9 cm. long; upper sepal 5–7 mm. long; lateral sepals 6–8.5 mm. long; petals 5–7 mm. long; lip 6–10 mm. long; spur 0.9–1.3 cm. long; capsules 0.9–1.4 cm. long.

Although the Newfoundland plant is rather sharply differentiated from typical *Habenaria Hookeri* in the size of all its parts, there is a transitional series at the extreme northeastern limit of the species on the continent. All the material I have seen from Aroostook County, Maine and from the region just to the north in Temiscouata, Rimouski, Charlevoix and extreme western Saguenay Counties, Quebec has the short spur and lip of var. *abbreviata*, but in size of sepals and leaves and in stature it is as large as in typical *H. Hookeri*, the spurs being 9–14 mm. long, the upper sepal 7–9 mm. long, the lip 7.5–10 mm. long, but the leaves 6–12 cm. long, the spikes 0.6–2.2 dm. long; and occasional specimens from northern Vermont and northern New York indicate a similar transition. The only material at hand from the Magdalen Islands is overripe and with a very short fruiting spike; but it has lost the distinctive parts of the flowers.

H. orbiculata (Pursh) Torr. Frequent on the West Coast, occasional southward across the Island, as often in open as in wooded habitats (see pp. 8, 87 and map 9). The northernmost station is on Bonne Bay: in turf of *Scirpus cespitosus* var. *callosus* and in sphagnum, wet peaty bog-barrens at 400–550 m. alt., Lookout Mt., *Fernald, Long & Fogg*, no. 1554.

The western Newfoundland plants, like those from the Shickshock Mts. in Gaspé are very small, as compared with the large woodland plants of New England and the upland to North Carolina—leaves 4–9 cm. broad, scapes 1.5–2.5 dm. high, with racemes only 5–12 cm. long. I am unable to find any tangible character to separate this extreme series from the larger Alleghenian plant and particularly from the plants of western North America. In Newfoundland we, as yet, know *H. macrophylla* Goldie only from the extreme southeast, the Avalon Peninsula.

H. lacera (Michx.) R. Br., var. terrae-novae Fern. Rhodora, xxviii. 21 (1926). Range extended north to Bonne Bay: tableland of Lookout Mt.

H. psycodes (L.) Spreng. The northern limit seems to be on Bonne Bay: extremely abundant, dominant, occurring in many thousands of individuals on meadows and peats both at sea-level and on the tablelands.

The combination *Habenaria psycodes* was first made in Spreng. Syst. iii. 693 (1826) and, nomenclaturally, the combination rests upon *Orchis psycodes* L. (1753); therefore, the combination should be referred to (L.) Spreng., even though Sprengel was confused as to the exact application of the name.

Pogonia ophioglossoides (L.) Ker. The northern limit in western Newfoundland seems to be on Bonne Bay: wet peaty barrens at about 395 m., Lookout Mt., *Fernald, Long & Fogg*, no. 1556.

Calopogon pulchellus (Sw.) R. Br. The northern limit in western Newfoundland is apparently on Bonne Bay: very rare on wet peaty barrens at about 365 m., Lookout Mt., *Fernald, Long & Fogg*, no. 1557.

Calopogon pulchellus is certainly not as common in western Newfoundland as *Pogonia ophioglossoides* and *Arethusa bulbosa*. It is, judging from collections made by others, apparently commoner in the eastern half of the Island, especially about Notre Dame Bay. Of the five collections in the Gray Herbarium from western Newfoundland, four were particularly noted by their collectors as rare: Lookout Mt., Bonne Bay, "very rare"; Lark Harbor, Bay of Islands (*Fernald, Long & Fogg*, no. 201), "very rare"; Blomidon (*Mackenzie & Griscom*, no. 10,226), "scarce"; Port aux Basques (*Fernald, Long & Dunbar*, no. 26,542), "very scarce."

Listera borealis Morong. St. John Bay: pastured spruce woods and thickets, Eddy's (Old Man's) Cove, *Fernald, Long & Fogg*, no. 1560.

A characteristic individual of this species, well known from Anticosti and the Mingan Islands, was found by Long in an area close to shore (the habitat on Anticosti and the Mingans), where, most unfortunately, the cattle had wrought almost complete destruction. Search in the region, extending along the coast for several miles, failed to bring to light another specimen. See pp. 60, 61.

Malaxis brachypoda (Gray) Fern. Rhodora, xxviii. 176 (1926). Apparently more abundant in western Newfoundland than in most areas on the continent, often in colonies of hundreds (sometimes thousands) of plants.

This species is so sharply distinguished from the Eurasian *Malaxis monophyllos* (L.) Sw. that, now that its characters have been pointed out, it is surprising to see it united again with the Eurasian (and Alaskan) plant, as *M. monophyllos*, var. *brachypoda* (Gray) F. Morris in Morris & Eames, Our Wild Orchids, 358, plates 110 and 111 (1929). The more important diagnostic points, as already summarized, are:

M. MONOPHYLLOS. Flower-bud just before expanding ovate-lanceolate, 2–3 mm. long: pedicel and ovary during anthesis 2.5–4 mm. long: expanded perianth 4–6.5 mm. broad: flower resupinate, the lip and lateral sepals subconnivent and projected forward: capsules 5–7 mm. long, on twisted pedicels 3–5 mm. long, crowned by the subconnivent ascending perianth-segments.

M. BRACHYPODA. Flower-bud just before expanding ovate, 1.5–2 mm. long: pedicel and ovary during anthesis 1.5–3 mm. long: expanded perianth 3–5 mm. broad: perianth-segments (including lip) strongly divergent, perpendicular to the axis of the ovary, finally reflexed and appressed to the ovary, the lip drooping: capsules 3–5 mm. long, on straight pedicels 1–2 mm. long, crowned by the reflexed and appressed perianth-segments.

Since the clear differences have not been wholly appreciated (the plants being insignificant), it seems desirable to make them clear by photography. In PLATE 253 enlarged details of the two are displayed side-by-side.

These differences, with complete geographic isolation, certainly are specific. I am not familiar with the Old World *Malaxis monophyllos* growing nor sufficiently conversant with folk-lore as to know whether the English name used by Morris, "White Adder's Mouth," applies to the European plant. As a pseudonym for our plant with greenish-yellow flowers it is not descriptive.

SALIX LUCIDA Muhl., var. INTONSA Fern. Extending north to BONNE BAY: gravelly shores and alluvial islands near mouth of Main River, *Fernald & Long*, no. 1577.

*S. UVA-URSI Pursh, forma **phyllolepis**, f. nov., bracteis (squamis) amentorum foliaceis; ovariis abortivis. PORT AU PORT BAY: dry limestone barrens, upper slopes and tablelands, alt. 200–300 m., Table Mt., August 16, 1910, *Fernald, Wiegand & Kittredge*, no. 3171 (TYPE in Gray Herb.).

S. HERBACEA L. Additional stations from the HIGHLANDS OF ST. JOHN: mossy shelves of quartzite cliffs at head of Yellow Brook, Doctor Hill, and shelves of cliffs at head of Deep Gulch, Doctor Hill, *Fernald, Long & Fogg*, nos. 1588, 1589.

S. CORDIFOLIA Pursh, var. CALLICARPAEA (Trautv.) Fern. RHODORA, xxviii. 184 (1926). Extended south to BONNE BAY: large shrubs, up to 2 dm. high, damp thicket under limestone crest (alt. 650 m.), Killdevil, *Fernald, Long & Fogg*, no. 1597.

S. CORDATA Muhl. Extended north to BONNE BAY: gravelly shores and alluvial islands near mouth of Main River, *Fernald & Long*, no. 1594.

S. PEDUNCULATA Fern. RHODORA, xxviii. 188 (1926). Extended south from the Straits of Belle Isle to POINTE RICHE: damp open depressions in limestone barrens, *Fernald, Long & Fogg*, no. 1595, heavily fruiting shrubs with decumbent branches, and aments up to 1 dm. long; no. 1596, same habitat, shrubs sterile (presumably staminate), more ascending, up to 1 m. high.

S. GLAUCOPHYLLOIDES Fern. The northern limit is apparently on BONNE BAY: gravelly shores and alluvial islands near mouth of Main River, *R. H. Kimball*, no. 15; *Fernald & Long*, nos. 1598, 1599.

SALIX (§ CHRYSANTHEAE) **Wiegandii**, n. sp. (TAB. 254), frutex depressus vel adscendens 1–3 dm. altus *S. lanatam* simulans; ramis ramulisque decumbentibus vel adscendentibus crassis castaneis deinde cinereis juvenilibus cano-tomentosis; gemmis bene evolutis ovoideis apice rotundatis 5–6 mm. longis cano-tomentosis; foliis ovalibus vel oblongis deinde 1.5–4.5 cm. longis 0.4–2.8 cm. latis rigido-coreaceis utrinque sparse floccoso-lanatis integris margine revolutis venis subtus prominentibus scrobiculato-reticulatis, petiolis crassis lanatis 3–8 mm. longis; stipulis oblique cordato-ovatis coriaceis plerumque glanduloso-serratis subtus reticulatis 0.2–1.2 cm. longis; amentis femineis breviter pedunculatis pedunculo foliis 3–4 munito 2.7–6 cm. longis 1–1.5 cm. crassis densifloris, pedunculo rhachique villosis vel villoso-tomentosis; bracteis (squamis) obovatis obtusis atris 2–2.5 mm. longis pilis cinereis vel sordidis crispato-villosis; capsulis lanceolato-conicis 6–7 mm. longis sparse villoso-tomentosis vel glabratis subsessilibus, stylo elongato tenui 2 mm. longo, stigmatibus integris 0.5–0.7 mm. longis; glandula bractea breviora; amentis masculis 1–1.5 cm. longis; filamentis glabris.—Western NEWFOUNDLAND, in the region bordering St. John Bay and Ingornachoix Bay: damp rocky limestone barrens, near sea-level, Ingornachoix Bay, August 4, 1910, *Fernald, Wiegand & Kittredge*, no. 3185 (mature foliage and buds); trailing on turfy talus of limestone headland, Gargamelle Cove, Ingornachoix Bay, July 20, 1929, *Fernald, Long & Fogg*, no. 1602—flowering pistillate shrubs (TYPE in Gray Herb.); turfy and peaty margins of dry gravelly limestone barrens, Old Port au Choix, St. John Bay, July 22, 1929, *Fernald, Long & Fogg*, nos. 1603 (fruiting) and 1604 (with shriveled staminate ament showing glabrous filaments); damp open depressions in limestone barrens, Pointe Riche, July 24, 1929, *Fernald, Long & Fogg*, no. 1605 (fruiting).

Although the original sterile material of *Salix Wiegandii* was labelled as collected by *Fernald, Wiegand and Kittredge*, it was actually found by Prof. Wiegand and Mr. Kittredge, since I was at that date on the Labrador coast (our specimens of 1910 and 1911 being "pooled," we followed the practice, now found to be unfortunately misleading, of using a joint label for all collections whether jointly or individually made). *S. Wiegandii*, now secured in both flower and fruit, proves to

be a most distinct species with which it is a keen pleasure to associate the name of its discoverer.

Salix Wiegandii is a most interesting new member of § *Chrysantheae* Koch (§ *Lanatae* Koehne) not closely related to any known member of that boreal group. It occurs in the same region as *S. calcicola* Fern. & Wieg. and like that species has very short staminate aments (the staminate aments of *S. calcicola*, heretofore undescribed but now known through 7 collections, being 1.5–2.5 cm. long) and pistillate aments of about the same size as in *S. calcicola;* but in most characters the two are thoroughly distinct. The young branchlets of *S. calcicola* are villous, of *S. Wiegandii* lanate; the leaves of *S. calcicola* glabrous or quickly glabrate, in expanding sometimes loosely villous, and of a broad-ovate to suborbicular outline, the leaves of *S. Wiegandii* permanently lanate upon both surfaces and of an oval to oblong or slightly obovate outline; the large stipules of the vigorous shoots in *S. calcicola* taper subequally to base, those of *S. Wiegandii* are conspicuously inequalateral at the cordate base; the sessile aments of *S. calcicola* are from terminal or subterminal blackish and villous buds of the preceding year, the short peduncled and leafy-bracted aments of *S. Wiegandii* from axillary pale-brown and lanate buds; the capsules of *S. calcicola* are glabrous from the first, of *S. Wiegandii* mostly pubescent (at least at base) to maturity.

From the other American members of § *Chrysantheae, Salix Wiegandii* is at once distinguished. The only other member of the section known in eastern America is *S. laurentiana* Fernald, a small tree or tall shrub with the large leaves (up to 2 dm. long) crenate and on petioles mostly 1–2 cm. long, with aments up to 9 cm. long,[1] bracts (scales) oblong and brown and styles only 0.5–1 mm. long. *S. Richardsoni* Hook. of the Mackenzie and Alaskan area has villous-hirsute branchlets, staminate aments 3–4.5 cm. long, glabrous foliage, lance-attenuate and long-persistent stipules up to 2.5 cm. long and glabrous

[1] Dr. Camillo Schneider (Journ. Arn. Arb. i. 222), discussing *S. laurentiana*, suggests correction of the original description of the species, saying: "Fernald . . . says that the fruiting aments measure up to 9 cm. in length, while I have not seen any longer than 7 cm." The original collection of *Fernald & Collins* no. 202 (type number of *S. laurentiana*) consisted of 30 sheets, from which the description was drawn. The sheet retained in the Gray Herbarium did not have aments of the greatest length, but the sheet which went to the late Dr. G. G. Kennedy and which is now preserved at the Gray Herbarium shows an ament 8.5 cm. long; while among the 11 more recently collected numbers of *S. laurentiana* which Dr. Schneider has not examined there are several with aments fully 9 cm. long. The mature aments may reach a thickness of more than 2 cm., with capsules 1 cm. long.

Habenaria straminea: fig. 1, habit, × 1, from Newfoundland; fig. 2, flowers, × 6.
H. albida: fig. 3, flowers, × 6, from Scotland.

Habenaria Hookeri, var. abbreviata: habit, × 1, from type collection; flower (upper insert) × 2.
H. Hookeri: flower (lower insert) × 2.

capsules; *S. Wiegandii* can hardly be confused with it. *S. Barrattiana* Hook. of the Canadian Rocky Mountains is somewhat approached by *S. Wiegandii,* but its leaves have more sericeous-tomentose surfaces without the strong reticulation so conspicuous in *S. Wiegandii,* the stipules are semi-ovate and glabrous, the staminate aments 5 cm. long, and the pistillate up to 1 dm. long. *S. Tweedyi* (Bebb) Ball, originally from Big Horn Mountains, has glabrous and glandular-serrate leaves, glabrous capsules and usually forked stigmas. *S. Hookeriana* Barratt of the Pacific Coast is, like *S. laurentiana* of the eastern coast, a tree or large shrub, with the branchlets densely villous-tomentose, the leaves green and glabrate above and densely white-pubescent but scarcely reticulate beneath, stipules wanting or inconspicuous and styles short, as in *S. laurentiana. S. Piperi* Bebb of Washington and Oregon is, likewise, a large shrub, with short styles as in *S. laurentiana* and *S. Hookeriana;* it has glabrous branches, glabrous and serrulate leaves and long aments and is not closely approached by *S. Wiegandii. S. amplifolia* Coville of Alaska is also a tree, with densely villous branchlets, villous and glabrate obovate leaves, no conspicuous stipules, very long aments, glabrous capsules and very long styles (3–4 mm.); it is certainly not strongly approached by *S. Wiegandii. S. alaxensis* (Anderss.) Coville is also a tree or erect shrub, having the branches glabrous or villous or villous-lanate even when old, the leaves densely white-pannose beneath, the stipules linear to filiform and subentire and the aments very long (up to 1.4 dm.); it is not at all approached by *S. Wiegandii.*

S. Wiegandii seems to be as close to the arctic-alpine *S. lanata* L. of Eurasia as to any American member of the section; but *S. lanata* is a larger and usually less depressed shrub, with villous (instead of tomentose) branchlets, larger and more rounded to obovate leaves, much larger and persistent (as in *S. Richardsoni*) stipules, sessile mostly terminal and subterminal aments, the staminate much larger than in *S. Wiegandii,* bracts or scales with the long villous beard golden-yellow or cinereous, glabrous capsules and longer and often forking stigmas.

Fig. 1. Pistillate flower of Salix ancorifera, × 4.

Salix **ancorifera,** n. sp. (fig. 1), frutex *S. discolorem* simulans; ramulis novellis glabris fuscis nitidulis; foliis immaturis membranaceis anguste obovalibus 1.5–2.7 cm. longis, 0.5–1.5 cm. latis, juvinilibus minute rufescenti-pilosis glabratis costis utrinque

strigoso-pilosis marginibusque remote glanduloso-dentatis piloso-ciliolatis exceptis; amentis femeneis coetaneis breviter pedunculatis in anthesi 3.5–4.5 cm. longis 1.2–1.5 cm. crassis densifloris; pedunculis 5–8 mm. longis foliis 2–4 bracteiformibus munitis, pedunculo rhachique sericeo-pilosis; bracteis oblongis 3.5–4.5 mm. longis fulvis longe cinereo-villosis; ovariis subulato-attenuatis 5–6 mm. longis breviter cinereo-pilosis pilis nitidis; stylo 1 mm. longo, stigmatibus subulatis basi crassis valde recurvatis 1.5–2 mm. longis; pedicellis vix 1 mm. longis glandulam crassam paulo superantibus.—Western NEWFOUNDLAND: woods, McIver's Cove, Bay of Islands, May 31, 1898, *A. C. Waghorne*, no. 38, distributed as *S. phylicifolia* L. (TYPE in Gray Herb.).

Salix ancorifera for more than thirty years has been a perplexing plant. Originally labeled *S. phylicifolia*, it was later identified by me[1] as the problematic *S. Barclayi* **S. latiuscula* Anderss. Mon. Sal., Kongl. Svenska Vet.-Akad. Handl. vi. no. 1: 165 (1867) or *S. Barclayi*, *β. latiuscula* Anderss. in DC. Prodr. xvi.[2] 255 (1868),[2] while Mr. C. R. Ball has marked the specimen *S. discolor*. As Schneider has pointed out in Journ. Arn. Arb. i. 152 (1920), the Waghorne specimen can hardly be what Andersson described as *S. latiuscula*. The latter, a single specimen in the DeCandolle herbarium, collected in Newfoundland by De la Pylaie, was described with very slender nectary ("nectarium valde tenue"), but the nectary of the Waghorne specimen is very broad and stout. Schneider emphasizes that "As to the stigmas there is no mention in either of Andersson's rather long descriptions" but since Andersson stated in 1868 that *S. Barclayi* is similar, but differs in having the capsules glabrous, it is to be inferred that *S. latiuscula* has the short stigmas of *S. Barclayi*. As a matter of fact Andersson *did* describe the stigmas of *S. latiuscula*, in the fourth line of each of his two descriptions: "stylo brevi stigmatibus bifidis." Since the Waghorne specimen has simple and remarkably elongate and recurved stigmas (FIG. 1) and since its nectary as well as the toothing of the leaves and the long pubescence of the midrib so far depart from the characters of *S. latiuscula*, as described by Andersson, it seems advisable to give the shrub of McIver's Cove a definite name.[3] For the sketch (FIG. 1) I am indebted to Dr. Lyman B. Smith.

[1] Fernald, RHODORA, xvi. 175 (1914).

[2] Andersson seems to have been quite uncertain about the status of this plant. He originally published it with a binomial, as above, but appended without number to his numbered account of *S. Barclayi;* but the next year he treated it unequivocally as a variety of *S. Barclayi*. *S. latiuscula* was taken up as a definitely published species in *Index Kewensis* and I so considered it in 1914.

[3] It is not yet clear just what De la Pylaie collected as the basis of *S. latiuscula* or *S. Barclayi*, *β latiuscula*. According to Schneider, "Unfortunately the type is wanting in Herb. DeCandolle at Geneva from which Andersson had received it."—Journ. Arn. Arb. iii. 73 (1921). Like *S. ancorifera* and several other endemic willows of Newfoundland it is probably highly localized and perhaps now exterminated.

From *S. discolor* Muhl. which *S. ancorifera* simulates, it is distinguished not only by the very long and characteristically recurved stigmas, but by the glandular toothing of its leaves and by the peculiar long pubescence of the midrib; the erect or merely divergent stigmas of *S. discolor* being only half as long as in *S. ancorifera* and the leaves never displaying the long pubescence on the midribs.

Whether *Salix ancorifera* is still growing at McIver's Cove is doubtful. When Waghorne was there in 1898, there were only a few settlers; now there is a considerable village and much of the better land in the region has been put under cultivation. In early July, 1929, Messrs. Long, Fogg and I went to McIver's Cove for fruiting material. The older inhabitants well remembered Waghorne and his visit there; but no one in the village had ever seen or heard of a *wild* willow. They had plenty of *S. viminalis* planted, but a search of several hours, in which we had the enthusiastic coöperation of the helpful population, indicated that the statement given us upon first landing, that no native willow now grows there, is apparently correct. This excessive localization of relic-endemic willows in Newfoundland is quite in keeping with the extreme localization there and in Gaspé of many other relic-endemics. Thus *Salix leiolepis* Fernald, "a very peculiar species" (Schneider, Bot. Gaz. lxvii. 46), is known only from the type-collection from Table Mountain, Port au Port Bay; *S. chlorolepis* Fernald is known from only a single brook-valley on Mt. Albert in Gaspé; *S. amoena* Fernald, only from a single cove on Ha-Ha Bay, Straits of Belle Isle; *S. pedunculata* Fernald, from but two stations in northwestern Newfoundland; *S. obtusata* Fernald, a "remarkable species . . . of which much more copious material is needed to decide the question of its true relationship" (Schneider, Journ. Arn. Arb. i. 171), only from a single very limited stretch of river-gravel in Gaspé; *S. Wiegandii* (above described), only from the barrens near Old Port au Choix; and *S. latiuscula* Anderss., as yet not rediscovered and with the type-specimen lost, is apparently quite as rare. See p. 48.

(*To be continued*)

THE FLORA AROUND MISSISQUOI BAY, QUEBEC

Clarence Hinckley Knowlton

Numerous contacts with the flora of western Vermont, especially with the limestone areas near Lake Champlain, led me to wonder what plants grew at the northern, Canadian end of the lake. I was

especially interested because of the very choice group of calciphile plants which I have found in Swanton, Vermont, growing above or on the red magnesian limestone which abounds there. I have, therefore, made four separate visits to Missisquoi Bay and the hamlet of Philipsburg, Quebec, and have listed about 280 species; not an exhaustive survey of the region, but perhaps sufficiently extensive to warrant a report at this time.

On the lake shore at Philipsburg is a good exposure of the great fault, geologically speaking, by which large masses of lower Cambrian limestone and marble were pushed over a much younger Ordovician deposit. This Ordovician shale on the lake shore splits easily into shingle, much of the rock being veined with calcite. Inland are great masses of the older rocks, and one of the largest marble quarries in the Dominion of Canada is located here.

All unshaded limestone areas, in settled country, and particularly around old quarries, have a large number of very vigorous weeds, which crowd out many if not all of the native plants. There are at least forty of these weeds in this locality. Those which show marked calciphile affinities include the following:

Alyssum alyssoides
Arenaria serpyllifolia
Erysimum cheiranthoides
Melilotus alba
Vicia Cracca
Euphorbia Helioscopia
Cynoglossum officinale
Echium vulgare
Lappula virginiana
Lithospermum officinale
Nepeta Cataria

Of these, *Lappula virginiana* may be a native in this region. The rarest of the weeds noted is *Alyssum alyssoides*, which flourishes on the dry limestone. Blooming in May, its seeds are ripe in July. The plant is probably a winter annual. I have found this on the New York side of Lake Champlain, at Plattsburg, also in similar situations at Niagara Falls, Ontario. Once also, many years ago, I found it in sandy soil at Monument Beach, Bourne, Massachusetts.

In regard to *Cynoglossum officinale* it is interesting to note that Michaux, on his journey up the west side of Lake Champlain into Canada in 1792, found this plant already well established in the limestone country. The great abundance of *Nepeta Cataria* may be accounted for by the tradition that this herb was long ago introduced in the pastures as a source of nectar for bees.

At the west of International Highway No. 7, as you enter Canada, are flat ledges of limestone, some with light soil, others with

none. Occasional trees on this limestone are *Quercus macrocarpa, Juglans cinerea, Carya cordiformis* and *C. ovata, Ulmus fulva* and *U. americana,* and *Ostrya virginica.* In some places *Celastrus scandens* grows with *Rhus typhina,* forming thickets and fruiting heavily. The low form of *Rhus Toxicodendron* is frequent, and *Ribes Cynosbati* is occasional, but flourishes better in partial shade. The weed tree, *Crataegus punctata,* and numerous herbaceous weeds, also flourish here.

Beyond this dry strip with shallow sun-baked soil is a most wonderful glade-like woodland, which extends to the crest of the shore cliffs. In part of this the orchard-like forest is a solid formation of *Ostrya virginica;* in other places there are denser woods with sugar maples as well as hornbeams; on the lower levels toward the lake, especially on the shale, is a great abundance of *Thuja occidentalis,* without other trees. In the open woods under the hornbeam trees is a marvellous green carpet, in which the dominant species are *Cystopteris bulbifera* and *Mitella diphylla.*

In some such woodland not far away, "ad fines meridionales Canadae" by "Lac Champlain" Michaux found the unusual plant which he named *Mitella prostrata* (see Fernald, Rhodora viii, 90–92, 1906). Thinking it may have been here, one of my visits to this beautiful woodland was made on the King's Birthday, May 24, 1925. There were many thousand plants of *Mitella diphylla* in bloom, but after diligent search I was able to find no variations from the familiar type.

There are such charming spring and summer flowers in this region that I am tempted to comment on each species individually, but they are so numerous that a list must suffice.

Adiantum pedatum
Asplenium platyneuron
Camptosorus rhizophyllus
Agrostis perennans
Melica striata
Festuca nutans
Oryzopsis racemosa
Carex albicans
Carex albursina
Carex Deweyana
Carex eburnea
Carex pedunculata
Carex platyphylla
Carex rosea
Carex sparganioides
Trillium grandiflorum
Laportea canadensis
Parietaria pennsylvanica
Pilea pumila
Asarum canadense
Actaea alba
Actaea rubra
Hepatica acutiloba
Thalictrum dioicum
Dicentra Cucullaria
Dicentra canadensis
Sanguinaria canadensis
Dentaria diphylla
Fragaria vesca var. americana
Rubus odoratus

Rubus occidentalis
Geranium Robertianum
Viola canadensis
Viola conspersa
Viola eriocarpa
Viola rostrata
Viola sororia
Circaea alpina
Circaea latifolia
Osmorrhiza Claytoni
Osmorrhiza longistylis
Hydrophyllum virginianum
Phryma Leptostachya
Galium circaezans
Solidago caesia
Solidago latifolia

Sanguinaria canadensis deserves mention, because here it grows on the limestone, the rhizomes following along crevices in the ledge where there is little food or moisture, until the plant becomes very stunted. In three stations in eastern Massachusetts, at Weymouth, Hingham and Cohasset, the plant also grows in this way on diabase ledges and among diabase boulders, rather consistently avoiding granite. This is an interesting habitat for a plant which habitually reaches its maximum development in the alluvium along our rivers.

The cliffs of Utica or Canajoharie shale reach the lake shore, but do not extend above the village of Philipsburg, where everything near the bay is nearly level. I have explored about half a mile along these cliffs. The shingle is so loose that there is little opportunity for vegetation to catch in. The cliffs are crowned with *Thuja* trees, with a few straggling shrubs of *Cornus circinata.* In some of the crevices are specimens of *Athyrium angustum* var. *laurentianum.* Two grasses are frequent on the headlands, *Trisetum spicatum* and *Sphenopholis pallens.* *Vitis vulpina* is frequent, and in some places gets a foothold in the shingle on the beach. *Potentilla Anserina* has succeeded in rooting in the scanty soil between the loose chips of shale, and sends out its strawberry-like runners in all directions. Another headland plant of special interest is *Thalictrum confine*, well known along the rocky shores of Lake Champlain in Vermont. There are some other shrubs and plants which grow in favored spots on the Vermont shore which I have not yet found on these headlands. Further search may reveal them.

Missisquoi Bay is sheltered by the Swanton peninsula, and gets no large waves from the open lake. There is not very much beach, therefore, but a sandy slope with even grade running down to the water, with some wetter sloughs back from the lake margin. It is like the shores of the St. Lawrence in many ways, with a broad band of vegetation, mostly herbaceous, backed up with a fringe of trees. There are five of these trees which are characteristic—*Populus deltoides*, *Salix nigra*, *Acer rubrum* and *A. saccharinum*, the latter the

more abundant of the two, and *Fraxinus pennsylvanica*, all of which are common along the lake in Vermont. Other willows which I have noted are the shrubs, *Salix cordata*, *S. discolor*, *S. lucida* and *S. rostrata*. *Cephalanthus occidentalis* is abundant, and there are many cornel bushes—*Cornus stolonifera*, *C. alternifolia* and *C. Amomum*. In the swamps near Clarenceville is abundance of *Spiraea alba* DuRoi (*S. salicifolia* of Gray's Manual, 7th ed.), and it is to be expected elsewhere along the bay, as it is abundant in Swanton and Alburg, Vermont.

Potentilla Anserina and *Gratiola aurea* are the two common beach plants, in great variety and profusion. The common grasses of the swales are *Spartina Michauxiana*, *Calamagrostis canadensis*, *Leersia oryzoides* and *L. virginica*. *Zizania aquatica*, var. *angustifolia* is frequent in pools, and in a ditch near Venice, at the head of the bay, I found in 1931 the broad-leaved typical *Z. aquatica* in considerable quantity. Common sedges are *Carex flava*, *C. granularis*, *C. hystericina*, *C. Tuckermani*, *C. vesicaria* and *C. vulpinoidea*.

There were but two real surprises for me in this littoral belt, *Habenaria flava* and *Gerardia paupercula*. The *Habenaria* was not widely distributed, but grew in a large clump, with many specimens. The *Gerardia* grew in a sort of meadow, well back from the bay. It has several Vermont stations scattered along the northern end of Lake Champlain, as far north as Swanton.

Other species which are worth mentioning are:

Equisetum fluviatile
Alisma Plantago-aquatica subsp. brevipes
Elymus virginicus
Cyperus strigosus
Eleocharis palustris var. major
Scirpus americanus
Scirpus atrovirens
Scirpus cyperinus var. pelius
Scirpus pedicellatus
Juncus filiformis
Juncus pelocarpus
Juncus tenuis
Myrica Gale
Alnus incana
Rumex Patientia
Rumex verticillatus
Anemone canadensis
Ranunculus pennsylvanicus
Ranunculus reptans
Penthorum sedoides
Potentilla palustris
Apios tuberosa
Hypericum boreale
Hypericum ellipticum
Hypericum virginicum
Epilobium glandulosum var. adenocaulon
Epilobium molle
Cicuta bulbifera
Cicuta maculata
Sium suave
Steironema ciliatum
Steironema lanceolatum
Menyanthes trifoliata
Apocynum cannabinum
Asclepias incarnata
Cuscuta Gronovii

Scutellaria epilobiifolia
Scutellaria lateriflora
Stachys aspera var. tenuifolia
Galium Claytoni
Galium palustre
Campanula uliginosa
Lobelia cardinalis
Eupatorium maculatum

My 1932 visit took me to a swamp near the marble mill, a swamp which had evidently received the fine-grained tailings from the marble. There were numerous species here which I did not find close to the lake. Here was a wonderful quantity of *Scirpus atrovirens*, specimens in all sizes, but even the most diminutive seemed true to type, and not likely to be confused with var. *georgianus*. Along with the willows common by the lake were *Salix nigra* var. *falcata* and *S. petiolaris*. *Typha angustifolia* and *T. latifolia* were abundant. There was much of *Agrostis stolonifera* var. *compacta*, the common species of the salt marshes. The rushes were *Juncus bufonius*, *J. Dudleyi*, *J. nodosus* and *J. balticus* var. *littoralis*. In the drier land there were many coarse weeds, among them *Solidago altissima* and a green-flowered *Asclepias syriaca*.

As a general conclusion I may state that the calciphile flora of the uplands around Philipsburg is practically the same as that of western Vermont. Further, the flora of the lake shore is rather closely related to that along the shores of the St. Lawrence between Montreal and Trois-Rivières, as at Lac St. Pierre.

About three miles east of Philipsburg, in St. Armand township, are wonderful big limestone cliffs and rich woods that may yield further discoveries of interest to the botanist.

Hingham, Massachusetts.

NOTES FROM SOUTHEASTERN WISCONSIN—II[1]

S. C. Wadmond

Polystichum acrostichoides (Michx.) Schott. Apparently the only Wisconsin station of record is one north of Racine, Racine County (Wadmond, Trans. Wis. Acad., 16–2: 803, 1909), where a few individuals were taken on a rocky hillside. A single plant, only, was located in Richmond Township, Walworth County in the summer of 1931. It was taken in deep woodland, and quite likely a native station. This gives us but two stations in the State for the Christmas Fern!

Echinochloa Walteri (Pursh) Nash. To the Wisconsin stations

[1] Published with aid of a grant to Rhodora from the National Academy of Sciences.

listed by Fassett (Rhodora **32**: March 1930) may be added shores of Delavan Lake, Walworth County, where it is not uncommon.

Rynchospora capillacea Torr. Gray's Man. 7th ed. ranges it "e. Que. to w. Ont., s. very locally to N. J., Pa., O., Mich., and Mo." Represented in U. W. Herbarium by two collections, one from Waukesha County in 1859, *I. A. Lapham*, and the other from Bailey's Harbor, Door County, in 1929, *Dr. J. J. Davis*. The latter collection contains some var. leviseta. Taken by the writer in marly pools at Big Bend, Waukesha County, summer of 1932.

Carex Richardsonii R. Br. To the list of middle-western stations recorded for this "evasive" sedge by Prof. Fernald (Rhodora Nov. 1932), Dr. Fassett of the U. W. writes may be added that of Indiana Harbor, Inc., in sandy soil, May 28, 1904, *Robert Bebb* no. 1992.

Represented in U. W. Herbarium by collections from Brown County (Green Bay May 25, 1879, *J. H. Schuette*), and Dodge County (Horicon May 19, 1859, *I. A. Lapham*). Taken by the writer in Township of Mount Pleasant, Racine County (l. c. p. 816). The station was a low mucky prairie (locally known as Barnes Prairie), which at the time had never been ploughed, but which has long since been drained and devoted to celery, cabbages and truck gardening. It was not a dry situation by any means, thus differing from the habitat commonly ascribed to it.

Juncus Greenei Oakes & Tuckerm. Cheney (Pharmaceutical Archives, Apl. 1899) has reported this rush from the Dells of the Wisconsin River, Adams County, the only station known for the State. Represented at the U. W. Herbarium from additional stations in La Crosse, Jackson, Iowa, Marquette and Green Lake Counties. The Museum Herbarium shows collections from the counties of Dunn, Manitowoc, Eau Claire, Waushara and Shawano. To these may now be added Walworth County, where it was found in the Township of East Troy in small numbers on a little sandy ridge separating the two arms of a *Larix* swamp.

Juncus balticus Willd., var. littoralis Engelm. Fassett (Rhodora 29: Nov. 1927) reported this rush frequent along the shores of Lakes Michigan and Superior but known inland in Wis. only from Dane and Racine Counties. It had, however, been collected by Milwaukee Museum expeditions as far back as 1915 from inland stations in the northwesterly counties of Douglas, Washburn and Price, and in 1913 and 1915 in the counties of Wood, Portage and Waupaca, in almost the exact center of the State. In 1928 it was reported in extreme northwestern Wis. from the margins of a number of lakes which in early post-glacial times were undoubtedly connected. (Aldrich & Fassett Science **70**: July 12, 1929, pp. 45–46.)

Collected by the writer in moist sand on margin of pond in a depression bordering the Kettle Moraine, Township of La Grange, Walworth County, and in gravel pits along railroad at Beloit, Rock

County; the former is undoubtedly a native station, the latter probably an introduction.

Juncus balticus var. littoralis f. dissitiflorus Engelm. In addition to the Wisconsin stations listed by Fassett (l. c.), may be recorded collections in the Milwaukee Museum from Apostle Islands, Ashland County, and in the writer's herbarium from the beach of Lake Michigan at Racine, Racine County.

Juncus alpinus Vill. vars. insignis Fries and fuscescens Fernald. Reported in Swezey's State List (1883) from Manitowoc County only, on authority of Th. A. Bruhin.

Dr. Fassett reports both of these varieties common along the shores of Lakes Michigan and Superior. Known inland from the northwesterly county of Burnett, the site of the early post-glacial Barrens Lake, and from Adams and Waushara Counties, within the boundaries of another early post-glacial lake, Lake Oshkosh. The writer finds it in Walworth County along an old railroad cut on a springy clay slope containing a generous admixture of gravel.

Phytolacca americana L. Cheney (Pharmaceutical Archives Apl. 1899) recorded this species as of rare occurrence in the State, it appearing in the U. W. Herbarium from Jefferson County only. Material has since accumulated there from one station each in Rock, Dane and Grant Counties. The writer located it in the summer of 1931 at several points in the extreme southeast corner of Rock County. It apparently has come up from the south along the larger waterways.

Cycloloma atriplicifolium (Spreng.) Coult. Cheney (l. c.) reported a single individual at Madison, Dane county, collected by *Dr. True*. He added that he had observed it in great abundance along the Wisconsin (doubtless Mississippi is intended) river bank a few miles above La Crosse, La Crosse County. Reported by the writer (l. c. p. 832) from the Lake Michigan beach in Racine and Kenosha Counties, where observation this last summer showed it very widely established. This emigrant from the western plains appears now to have advanced up the Wisconsin, Black and Chippewa Rivers as well as the Mississippi, besides being recorded from a half dozen counties in the northern one-third of the State, and from the east-central county of Brown.

Silene dichotoma Ehrh. The earliest record for the State is a sheet at the Milwaukee Public Museum taken in Town of Greenfield, Milwaukee County, in 1915. Other sheets in the Museum Herbarium are from Douglas and Washburn Counties, in the extreme northwesterly corner of the State. The only record at the U. W. Herbarium is a collection by Fassett in the jack-pine barrens of Douglas County. Taken in the summer of 1932 by the writer along right-of-way of the C. M. St. P. & Pac. R. R. at the station of Walworth, Walworth County, pretty well into the southeasterly corner of the State. Gray's Man., 7th ed. reports it as ranging "N. E. to Tex., and on the Pacific Slope."

POLYGALA SENEGA L., var. LATIFOLIA T. & G. Apparently confined to the extreme southeasterly portion of the State. There is a collection from Kenosha County by the writer (l. c., p. 848), and in the Museum Herbarium a fine specimen taken at Wauwatosa, Milwaukee County, with leaves up to 4 cm. wide and 8 cm. long.

HYPERICUM CISTIFOLIUM Lam. This species does not appear in the latest revision of Wisconsin Hypericaceae (McLaughlin, Trans. Wis. Acad., 26: 281–288, 1931). Taken by the writer at several stations near by and on the banks of the Sugar River, 2 mi. w. of Brodhead, Green County, apparently the first record for the State.

GENTIANA SAPONARIA L. Appears to be limited in U. W. collections to the northwesterly Counties of Pierce, Burnett, Sawyer, Price and Ashland, plus a single collection in Dane County. To this list may now be added Racine County, along right-of-way of C. M. St. P. & Pac. R. R., between stations of Union Grove and Sylvania.

PENSTEMON GRANDIFLORUS Nutt. Represented in U. W. Herbarium from Polk, St. Croix and Pierce Counties (where probably native), and Juneau County along the railroad (probably an introduction). The Museum has sheets from Pierce (probably native), Monroe and Sauk Counties (probably introduced).

Taken by the writer in sand pits along railroad at Beloit, Rock County, a probable introduction.

PLANTAGO PURSHII R. & S. Recorded from most of the counties in the western third of the State, and from the southeasterly counties of Rock, Waukesha and Milwaukee. Taken this summer in sandy meadows in the extreme southeasterly corner of Jefferson County, just across the Walworth County line.

PLANTAGO ARISTATA Michx. Cheney (l. c.) reported a single plant collected at a suburb of Madison, Dane County and Beaver Dam, Dodge County, probably introduced in both instances with grass seed. It has since been recorded at U. W. Herbarium from Waushara, Iowa and Green Counties, and at the Milwaukee Museum from Grant, Waushara, Wood and Marathon Counties. The writer found it in great abundance during the summer of 1931 in grain fields and pasture land all along the Little Sugar River north of Albany, Green County.

POLYMNIA CANADENSIS L. Cheney (l. c.) reported collecting this in La Fayette and Dane Counties only. This rather local plant is now represented in the Herbaria of the Univ. of Wisconsin, Milwaukee Public Museum, and the writer, by collections from the majority of counties in the southern two-thirds of the State, plus a record from the northwesterly county of Burnett.

ARTEMISIA FRIGIDA Willd. The earliest record from the State appears to be a collection in 1886 from Jefferson County, Milwaukee Public Museum. Also represented there from Washburn and Columbia Counties, in all cases found on railroad ballast.

This western wormwood sage was collected by Fassett in 1927 in

large tufts on bare dry rock on summit of bluff at Bay City, Pierce County, believed by him to be native and probably the only native station in the State. Collected by Dr. J. J. Davis at Maiden Rock, Pierce County, and by the writer at Beloit, Rock County, in both cases along the railroad and doubtless introduced through that medium. Mr. Weatherby writes that the Gray Herbarium has specimens from Dearborn, Mich., also collected along railroad.

The writer is greatly indebted to Dr. N. C. Fassett of the University of Wisconsin for information as to Wisconsin localities, to Mr. A. M. Fuller, Associate Curator of Botany, for the loan of material from the Milwaukee Public Museum, and to Mr. C. A. Weatherby of the Gray Herbarium for verifications. Material of all of the above numbers has been deposited either at the Gray Herbarium or that of the Univ. of Wisconsin.

Delavan, Wisconsin.

Myriotrichia densa in New England.—As is frequently stated in the books and is well known among practical algologists, six species of *Myriotrichia* are listed from the coasts of North America and Europe. But despite the repeated attempts of authorities to delimit these species, no one seems as yet to have met with success in his efforts. In the *Phycologia Britannica* (1851) Harvey figured and described two species—*M. clavæformis* and *M. filiformis*. In the *Nereis Boreali-Americana* he listed but the last-named species, and this only from Penobscot Bay. When Farlow published his *Marine Algæ of New England*, in 1881, he described the two species of Harvey, but properly reduced *M. filiformis* to a variety. He quoted Naegeli's work on the development of the thallus, as his authority for this act; for Naegeli had shown plainly that *M. filiformis* was only the young stage of *M. clavæformis*. In 1881 three species were listed in the genus. By the work of Hauck and others this number has been increased to six, the latest addition being *M. densa* Batters in 1895. The renowned Dr. Kuckuck, in his revision of the genus in 1899, attempted to retain all these species and to differentiate between them. To this writer it would seem with but indifferent success; for, in this country, we seem to have but one polymorphic species which assumes very different aspects as its development proceeds. But if we are to recognize *M. densa* as a valid species, I beg leave to record that we find what seems this form growing

occasionally in Blue Hill Bay of this state. The English specimens occur on *Zostera,* but here we have noted it only on *Asperococcus* and *Scytosiphon.*—R. E. Schuh, Brooklin, Maine.

AN UNDESCRIBED MUTISIA FROM ECUADOR

Stuart K. Harris

Mutisia **Rimbachii** Sod. in herb., n. sp. Frutex scandens, caule lignescenti, angulato; ramis ochroleuco-tomentosis; folia alterna brevissime petiolata vel subsessilia, pinnata, apice in cirrhum utrinque tripartitum protensa, cirrho excepto 1 dm. longa; segmenta distantia utrinque 6–10, brevissime petiolulata, lanceolata vel elliptica, obtusa vel late acuta, submucronata, basi repanda subcordata, margine revoluta, supra glabra vel paulo tomentosa, subtus ochroleuco-lanata, coriacea, inferiora 2.5–4 cm. longa, 1–1.5 cm. lata, superiora minora; capitulum in pedunculo 3–4 cm. longo, campanulatum, circa 8 cm. longum, 3–4 cm. latum, multiflorum, heterogamum; tegulae circa 3-seriatae, imbricatae, integerrimae, dense viridi-tomentosae, interiores ovato-oblongae vel lineari-oblongae, 4 cm. longae, exteriores minores, ovatae; flores marginales circa 12, flores disci breviores; achenia ignota.

Climbing shrub, stem woody, angular; the branches covered with an ochroleucous tomentum: leaves alternate, shortly petiolate or subsessile, pinnate, the tip extended as a three-parted tendril, 1 dm. long except for the tendril; leaflets in 6–10 pairs, shortly petiolulate, lanceolate or elliptic, obtuse or broadly acute, submucronate, the bases slightly subcordate, the margins inrolled, glabrous or sparingly tomentose above, ochroleuco-lanate beneath, coriaceous, the lower 2.5–4 cm. long, 1–1.5 cm. wide, the upper smaller: heads on peduncles 3–4 cm. long, campanulate, about 8 cm. long, 3–4 cm. wide, many flowered, heterogamous; tegules in about 3 series, imbricate, entire, densely green-tomentose, the inner ovate-oblong or linear-oblong, 4 cm. long, the outer smaller, ovate; marginal ray flowers about 12, flowers of the disk smaller; achenes unknown.

Spruce, no. 5456, in Andibus Ecuadorensibus, 1857–9; *Rimbach* no. 198, Ecuador, Carihuairazo 3500 m., June, as *Mutisia Rimbachii* Sod. (type, from photograph of sheet in Berlin Herbarium).

The vegetative parts of this species seem almost identical with those of *Mutisia pinchinchense* Krst. The involucre of *M. Rimbachii* is campanulate in herbarium material, however, while that of *M. pinchinchense* is cylindric. The bracts of the involucre of *M. Rimbachii* are covered with a long, very dense, green tomentum while those of *M. pinchinchense* have an ochroleucous tomentum mostly

confined to the margins. Spruce gave to this species a manuscript name which he seems never to have published and which has since been used for a simple-leaved species by Philippi in Anal. Univ. Chile, lxxxv. 820 (1894). The description of *M. Rimbachii* also seems never to have been published by Sodiro, and I propose, therefore, to validate that name for this very distinctive species.

The Rimbach specimen was collected sometime prior to 1921 on Mt. Carihuairazo in Tungurahua Province, Ecuador. The Spruce specimen is labelled only *In Andibus Ecuadorensibus, 1857–9.* A perusal of Spruce's *Journal* shows that during the years 1857–9 Spruce made his headquarters at Ambato, in Tungurahua Province and that between the 23rd and 31st of June, 1851, he made a collecting trip to Mt. Carihuairazo. Is it not possible, therefore, that this Mutisia was found by Spruce in the locality where it was later found by Rimbach and that this is another of those endemic species so characteristic of the Andes of Ecuador?

Gray Herbarium, Cambridge.

THE SLENDER-SPIKED SPARTINA PECTINATA[1]

M. L. Fernald

In his *North American Species of Spartina*,[2] Merrill more satisfactorily differentiated than had his predecessors the essentially southern coarse halophyte, *Spartina polystachya* (Michx.) Willd., and the more slender, northern transcontinental plant, with long-awned glumes, which, following erroneous usage, he called *S. cynosuroides* (L.) Willd., the latter based on *Dactylis cynosuroides* L. (1753). At that time Merrill cited for the transcontinental plant the synonym *S. pectinata* "Bosc." (1820).

Subsequently, Piper,[3] pointing out that the type of *Dactylis cynosuroides* L. is the coarse southern species long known as *Spartina polystachya*, correctly took up *S. pectinata* Link (1820) for the more slender transcontinental plant. But Hitchcock, reasoning that "*S. pectinata* was collected by Bosc probably in South Carolina, where *S. michauxiana* does not grow," renamed the slender transcontinental species *S. Michauxiana* Hitchc. Contr. U. S. Nat. Herb. xii. 153 (1908).

[1] Published with aid of a grant to Rhodora from the National Academy of Sciences.
[2] Merrill, U. S. Dept. Agric. Bur. Pl. Ind. Bull. no. 9 (1902).
[3] Piper, Contrib. U. S. Nat. Herb. xi. 145 (1906).

Piper's correct identification of *Spartina pectinata* was followed by Rydberg,[1] although he ascribed the species to Bosc, who sent the specimen to Berlin, rather than to Link, who described it. And very recently Hitchcock has accepted the reduction of *S. Michauxiana*, but, likewise, ascribed *S. pectinata* to Bosc instead of Link. "*S. pectinata* Bosc (*S. michauxiana*)."[2] The reduction of *S. Michauxiana* to *S. pectinata* seems wholly justified. In the Gray Herbarium there is a spike of Bosc's plant (TYPE of *S. pectinata* Link), given many years ago to Asa Gray. This is wholly characteristic in all points of the broader- and shorter-spiked plant so common across North America from Newfoundland to Washington, and south to Maryland, West Virginia and Texas.

Since the plant reaches Maryland and West Virginia, it is not impossible that its eastern range may extend farther south and that Bosc actually collected the specimen; it is equally possible that the specimen which he sent to Willdenow was derived from a northern source. Link's description, which is apparently not generally available, is here quoted. It is one of very many new descriptions in a paper by Link upon new plants in the Botanic Garden at Berlin and in the Willdenow Herbarium.

Spartina pectinata von Bosc. aus Nord-amerika im Herbar. Foliis convolutis, spiculis alternis solitariis secundis, rachi scabra, valvulis dorso scaberrimis. Hat viel kürzere Ähren als Sp. polystachya, auch kürzer gestielte. Die Ähren stehen immer einzeln, kommen nie doppelt.

The species, although ascribed by Merrill, Rydberg and Hitchcock to Bosc, was, apparently, not described by Bosc. The specimen in the Willdenow Herbarium was received from him, just as specimens of other species described by Link in the same paper were received from von Humboldt, Klein, Bory de St. Vincent, Petit Thouars, Desfontaines and others. The error of ascribing *Spartina pectinata* to Bosc started, apparently, in *Index Kewensis*. There Link's extensive paper in Sprengel, Schrader & Link's Jahrbücher der Gewächskunde, 1[3]. 13–93 (1820) seems to have been indexed with singular lack of consistency. In this paper Link varied the formula slightly when stating the source of the specimen in the Willdenow Herbarium; but the VON consistently used by him was obviously intended for FROM, COLLECTED BY, or SENT BY, not for OF. A few illustrations should make this clear. I am, therefore, quoting Link's phrase and then giving the interpretation of the authorship of the species by *Index Kewensis*.

[1] Rydb. Fl. Rocky Mts. and adj. Plains, 64 (1917 or 1918).
[2] Hitchc. Bartonia, no. 14: 29 (1932).

Link's Statement	Authorship acc. to Index Kewensis
Cyperus inaequalis von Humboldt aus Süd-Amerika.	*C. inaequalis* Link.
Cyperus festivus aus Indien von Klein gesandt.	*C. festivus* Link.
Mariscus mexicanus von Humboldt im Herbar.	*M. mexicanus* Willd. ex Link.
Kyllingia polyphylla von Petit Thouars aus Isle de France und *K. granularis* von Desfontaines aus Cayenne sind noch nicht beschrieben.	*K. polyphylla* Thou. ex Link, and *K. granularis* Desf. ex Link.
Hypaelytrum umbellatum aus Cayenne von Desfontaines im Herbarium.	*H. umbellatum* Willd. ex Link.
Hypaelytrum iridifolium. Eine sehr ausgezeichnete Pflanze, von Humboldt an den Ufern des Orinoko gesammelt, im Herbar.	*H. iridifolium* Link.
Spartina pectinata von Bosc. aus Nord-amerika im Herbar.	*Spartina pectinata* Bosc, ex Link.

From the above very brief tabulation it is clear that the entries in the *Index Kewensis* of species described by Link in the paper above cited need scrupulous checking and consistent treatment. It is also reasonably clear that the description of *Spartina pectinata* originated with Link, not with Bosc.

Spartina pectinata occurs in two strikingly different extremes. The widest-ranging and generally more common plant has the comparatively short and broad spikes (2–11 cm. long, 5–8 mm. wide, including the salient awns) sessile, subsessile, or the lowest short-peduncled. The extreme plant, described as *S. Michauxiana*, var. *Suttiei* Farwell, Rep. Mich. Acad. Sci. xxi. 352 (1920), from Michigan, has a broad range, from Prince Edward Island to Minnesota, south to Nova Scotia, southern New England, New Jersey, Pennsylvania, Kentucky, Missouri and Oklahoma. It is distinguished by its slender spikes (mostly 0.7–1.5 dm. long, 3–5 mm. wide), with appressed awns. The spikes are more inclined to be peduncled and more divergently ascending, in extreme specimens even almost nodding. As a variety it is strongly marked; under *S. pectinata* it becomes

Spartina pectinata Link, var. **Suttiei** (Farw.), comb. nov. *S. Michauxiana*, var. *Suttiei* Farw. Rep. Mich. Acad. Sci. xxi. 352 (1920). Cotype in Gray Herb.

A Suppressed Plate in Eaton's Ferns of North America.—In the library of botanical books collected by the late Walter Deane and bequeathed by him to the Gray Herbarium was found, in the original paper covers, a copy of Part I of D. C. Eaton's *Ferns of North*

America. This consists of three plates with twenty pages of descriptions. Plates I and III are the same as in the two copies of the complete work in the Gray Herbarium library and in that among the Deane books, but plate II is quite different. The usual one is made up of two figures, *Cheilanthes Cooperae* and *C. vestita,* both represented by whole plants, while the other, without names on the plate, contains three drawings of ferns, the first two of detached fronds only, numbered one, two and three, which, according to the text, are respectively *C. Cooperae, C. lanuginosa,* and *C. californica.*

Apparently this particular Part I was sent out as a prospectus and in the final publication a new plate II was substituted. The original plate II was eventually redrawn, with the omission of *C. Cooperae,* and issued as plate VI.—Ruth D. Sanderson, Gray Herbarium.

Notes on the Flora of Haverhill, Massachusetts.—Two years of collecting in Haverhill, Essex County, Massachusetts, has disclosed several interesting introductions and extensions of ranges. During the spring of 1932 I made several trips to Gray and Cole's Nursery and collected introduced plants growing as weeds among the beds. The entire nursery was covered by a rather peculiar looking Poa which Prof. Fernald identified as *Poa Chapmaniana* Scrib. This plant is a native of the South, growing as far north as Delaware. The only previously known records to the north of Virginia are one from Arlington, District of Columbia[1] and one from Townsend, Delaware.[2] A single plant of another uncommon grass was also collected. This was *Apera spica-venti* (L.) Beauv., which is known in Massachusetts only from collections made in South Boston in 1878 and 1879. The beds were also full of *Draba verna* L. and a strange member of the *Caryophyllaceae* in which the flowers were borne in umbels. This was found to be *Holosteum umbellatum* L., new to Massachusetts. This plant was found growing in company with *Draba verna* in the Hiti Nursery at Pomfret, Connecticut by Mr. F. W. Hunnewell in 1924,[3] the first record in New England. It was later found by Mr. C. A. Weatherby and Mr. W. A. Anderson along the Cliff Walk at Newport, Rhode Island. Mr. Cole told me that they have received plants from the Hiti Nursery and the Holosteum was probably introduced in this manner.

1 Hitchcock, A. S. and Standley, P. C., Cont. U. S. Nat. Herb. xxi. 88 (1919).
2 Long, Bayard, Bartonia, no. 10: 35 (1927–1928).
3 Hunnewell, F. W., Rhodora, xxvi. 199 (1924).

In September a visit to the town dump on Primrose Street was rewarded by the discovery of two more interesting introductions. The first of these was *Axyris amarantoides* L., hitherto known in New England by a single collection made in North Bridgton, Maine in 1921 by Mrs. E. M. Mead.[1] This plant is a native of Siberia which has become naturalized in the Middle West and appears to be spreading eastward. The other was *Plantago arenaria* W. & K., a pretty European weed which is establishing itself in North America.

At the mouth of Cottle's Creek I found *Scirpus pedicellatus* Fernald, which was previously known in Massachusetts only from Berkshire County. Another interesting extension of range was that of *Bidens cernua* L., var. *minima* (Huds.) DC., which had been taken in the state only at Amherst and in Berkshire County. This plant was found along the shores of both Kenoza Lake and Crystal Lake. It seems probable that this will be found to be growing in all parts of the state as more extensive botanizing is done. Specimens of all the plants mentioned have been deposited in the herbarium of the New England Botanical Club.—Stuart K. Harris, Gray Herbarium, Cambridge.

Rorippa amphibia in Androscoggin County, Maine.—A recent note[2] on the occurrence of this plant in Connecticut and near Montreal in Canada, calls to mind that the writer made collection of the same species in Maine, on June 18 and August 12, 1928. Specimens from the August collection have been identified by Mr. C. A. Weatherby.

The station is at the southeastern extremity of Lake Auburn, Auburn, Androscoggin County, Maine. This section of the lake is between the Auburn-Turner roads (Highway No. 4) and the trolley road (now discontinued) which connected the townships named. Large amounts of filling have been used in building the causeways for the roads referred to, though no dumping ground exists there.

On the visit in June, the plants, which were numerous, were in full flower. The visit in August showed all of the capsules withered. Upon a careful search we were unable to find any capsules which had discharged seed. The submerged stems and branches were producing many young plants by budding.—Arthur H. Norton, Museum of Natural History, Portland, Maine.

Volume 35, no. 414, including pages 187–226 and 3 plates, was issued 9 June, 1933.

[1] Fernald, M. L., Rhodora, xxix. 224 (1927).
[2] 1931, Bradley, Rhodora 33: 192.

Malaxis brachypoda: fig. 1, habit, × 1, from Newfoundland; fig. 2, flowers, showing drooping lip, × 4, from Herkimer Co., New York; fig. 3, fruit, showing reflexed perianth, × 4, from Maine; fig. 4, expanding buds, × 4, from Quebec.
M. monophyllos: fig. 5, flowers, showing erect lip, × 4, from Switzerland; fig. 6, fruit, showing projecting shriveled perianth, × 4, from Russia; fig. 7, buds, × 4, from Bavaria.

Salix Wiegandii, × 1: fig. 1, mature branchlet; figs. 2 and 3, flowering (pistillate) branchlets.

AUG 5 1933

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB

Conducted and published for the Club, by

MERRITT LYNDON FERNALD, Editor-in-Chief

JAMES FRANKLIN COLLINS
CHARLES ALFRED WEATHERBY } Associate Editors
LUDLOW GRISCOM

Vol. 35. August, 1933. No. 416.

CONTENTS:

Teratological Specimen of Cypripedium acaule. *A. H. Gustafson*. 263

Recent Discoveries in the Newfoundland Flora (continued). *M. L. Fernald* . . . 265

Notes on Missouri Plants. *J. A. Steyermark* . . . 283

Notes on Triglochin palustris and Montia lamprosperma in Maine. *A. H. Norton* . . . 291

Second Station for Isthmoplea in North America *R. E. Schuh* . . . 293

New York Record of Fraxinus profunda. *M. L. Fernald* . . . 293

Another Massachusetts Station for Calluna vulgaris. *R. J. Eaton* 294

Glyceria arkansana in Western New York. *M. L. Fernald* . . . 294

The New England Botanical Club, Inc.

8 and 10 West King St., Lancaster, Pa.

Room 1001, 53 State St., Boston, Mass.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price, $2.00 per year, net, postpaid, in funds payable at par in United States currency in Boston; single copies (if available) 20 cents. Volumes 1–8 or some single numbers from them can be supplied only at advanced prices which will be furnished on application. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be considered for publication to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than two pages of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

M. L. FERNALD, 14 Hawthorn Street, Cambridge, Mass.

Subscriptions (making *all remittances* payable to RHODORA) to

Ludlow Griscom, 8 W. King St., Lancaster, Pa., or Museum of Comparative Zoology, Cambridge, Mass.

Entered at Lancaster, Pa. Post Office as Second Class Mail Matter.

INTELLIGENCER PRINTING COMPANY

Specialists in Scientific and Technical Publications

EIGHT WEST KING ST., LANCASTER, PA.

CARD-INDEX OF NEW GENERA, SPECIES AND VARIETIES OF AMERICAN PLANTS, 1885 TO DATE.

For American taxonomists and all students of American plants the most important supplement to the Index Kewensis, this catalogue in several ways exceeds the latter work in detail, since it lists not only the flowering plants, but ferns and other vascular cryptogams, and includes not merely genera and species, but likewise subspecies, varieties and forms. A work of reference invaluable for larger herbaria, leading libraries, academies of sciences, and other centers of botanical activity. Issued quarterly, at $22.50 per 1000 cards.

GRAY HERBARIUM of Harvard University,
Cambridge, Mass., U. S. A.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. DAY. Leatherette. Pocket size. Invaluable for collector's memoranda and herbarium records. Published and sold by the GRAY HERBARIUM, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

MEMOIRS OF THE GRAY HERBARIUM. A series of illustrated quarto papers issued at irregular intervals, sold separately.

No. III. The Linear-leaved North American Species of Potamogeton, Section Axillares, by M. L. Fernald. 183 pp., 40 plates, 31 maps. 1932. $3.00.

Gray Herbarium of Harvard University, Cambridge, Mass.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3/4 in. 1 year $4.00, 6 months $2.50.

Arenaria marcescens: fig. 1, fragments, in flower, × 1, from Mt. Albert, Quebec; fig. 2, fruit, × 1, from the type, Blomidon, Newfoundland; fig. 3, seeds, × 10, from the type.

Arenaria norvegica: fig. 1, plant, × 1, from Torne Lappmark; fig. 2, seeds, × 10, from Norway.

A. cylindrocarpa: fig. 3, fragments, in young fruit, × 1, from Newfoundland; fig. 4, flower, × 6, from Quebec; fig. 5, mature fruit, × 6, from Newfoundland; fig. 6, seeds, × 10, from Newfoundland.

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 35. August, 1933. No. 416.

A TERATOLOGICAL SPECIMEN OF CYPRIPEDIUM ACAULE

A. H. Gustafson

The swamps of Pownal, Vermont have long been a favorite hunting ground for orchid lovers, especially since the appearance of Grace Greylock Niles' "Bog-Trotting for Orchids" a quarter of a century ago. While exploring the swamps for some of the rarer species, my companion, Mr. Reginald French of the Williams College faculty, called my attention to an unusual specimen of *Cyprepedium acaule* Ait. which had caught his eye. A casual examination showed several abnormal morphological features. The specimen was taken to the laboratory for more careful observation.

At first glance the most striking feature was that the plant bore two flowers instead of the usual single blossom. Miss Niles mentions two-flowered specimens. Possibly they are not rare but in my own field experience this is the first example found among several thousands of specimens examined over a period of several years. Most field observers are familiar with the wide range of color variation in the species and even albinos are apparently not rare. The specimen described below was white with just a suggestion of yellow.

The flower of the normal species is subtended by a bract. The inferior ovary lies between the bract and the rest of the floral parts. The single upper sepal and the two fused sepals together with the two strap-shaped petals and the large labellum appear to be borne from the top of the ovary. The column bearing the two fertile anthers, the curved stigma, and the large herbaceous staminode is borne above the ovary.

The accompanying figure (FIG. 1) illustrates the abnormal specimen. The bract at the left subtends a flower borne directly in the leaf axil. A second flower is borne at the apex of the main axis. The ovary of the axillary flower is from two to three times the length of a normal ovary. Above it are borne only two perianth structures—apparently sepals. The reproductive structures are also highly modified. The large conspicuous column is distinctly trilobed at the apex. Two fertile stamens are borne on very evident projections from the column. The staminode is not present. Microscopic examination

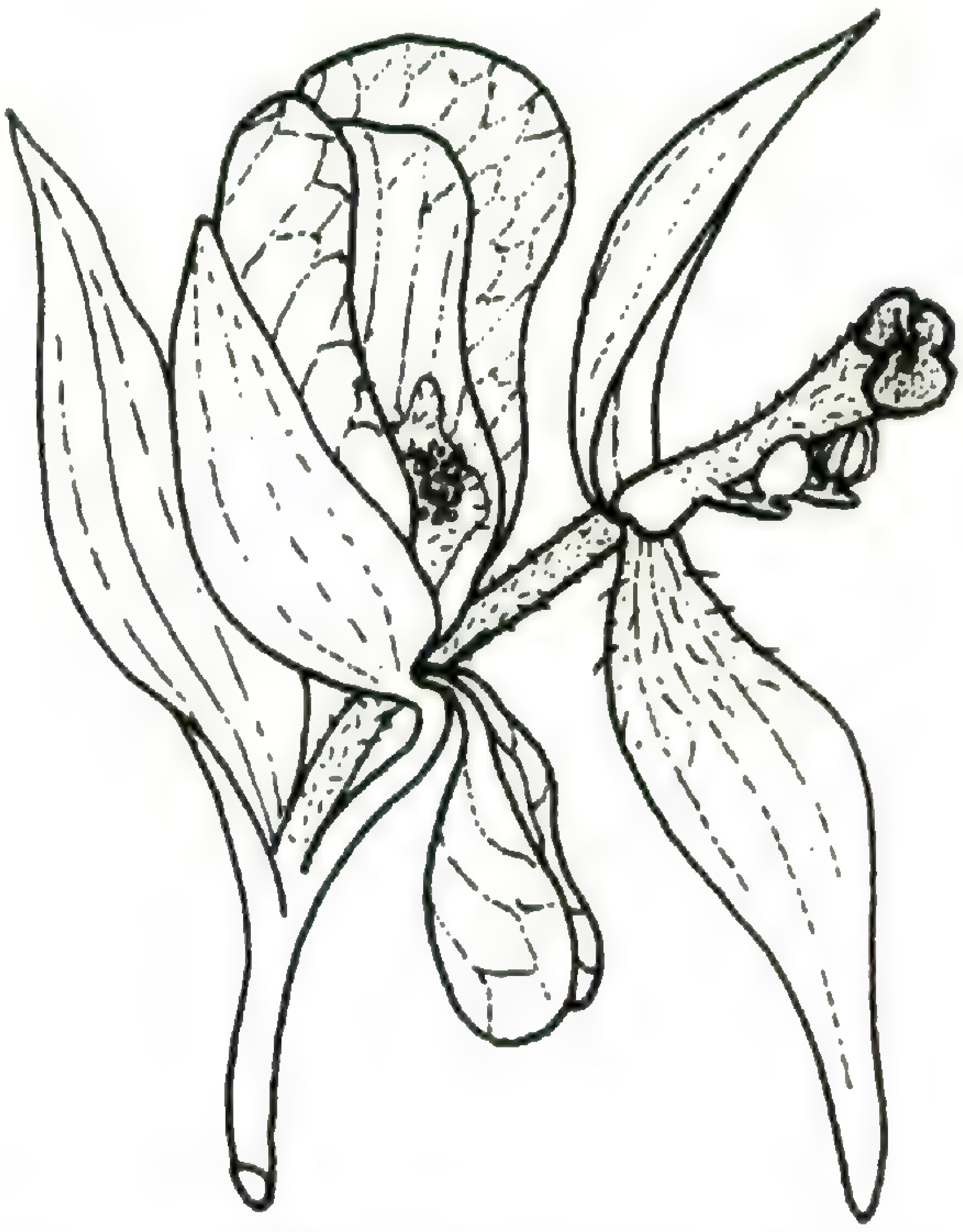


FIG. 1. Teratological CYPRIPEDIUM ACAULE.

of the ovules showed them to be of the same structure as ovules from a normal specimen.

The second flower is subtended by a bract. The perianth consists of two labellum-like structures. The lower of these is about one half the size of the upper which is slightly smaller than the labellum of a normal specimen. The upper structure encloses what appears to be a malformed ovary. At least, the small white objects borne on the outside of this tissue proved on microscopic examination to be rudimentary ovules.

The vegetative portions of the plant were normal in gross structure.

DEPARTMENT OF BIOLOGY,
WILLIAMS COLLEGE.

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. Fernald

(*Continued from page 247*)

Corylus cornuta Marsh. Range extended north to Bonne Bay: margins of thickets and woods, alluvial islands and shores at mouth of Main River, *Fernald, Long & Fogg*, no. 1627.

Arceuthobium pusillum Peck. Extended north to Bonne Bay: on *Picea mariana*, Deer Brook, *Fernald, Long & Fogg*, no. 1656; Main River, *Fernald & Long*, no. 1657.

Oxyria digyna (L.) Hill. Extended southward to southern entrance to Bonne Bay: shelves and talus of diorite cliffs (essentially at sea-level), Western Head, *Fernald, Long & Fogg*, no. 1658. See p. 93 and map 11.

*Polygonum allocarpum Blake, Rhodora, xix. 234 (1917). District of Burgeo and La Poile: cobbly barrier-beach, Great Barachois (or Barasway Bay), *Fernald, Long & Fogg*, no. 228.

An extension north from Nova Scotia.

Salsola Kali L., var. caroliniana (Walt.) Mett. District of Burgeo and La Poile: with the pubescent form, upper border of sandy beach, Sand Bank, west of Burgeo, *Fernald, Long & Fogg*, no. 242.

Previously known from the Bay of Islands.

Arenaria marcescens Fern. To the stations already recorded add Bay of Islands: crests of dry serpentine ridge, North Arm, *Long & Fogg*, no. 250.

The species is on all the serpentine areas of western Newfoundland. Plate 255 shows flowering and fruiting branches, life-size, and seeds × 10.

A. cylindrocarpa Fern. Plate 256. Apparently on all the more exposed limestone or serpentine areas of the West Coast.

The plate shows small fragments of the extensively creeping *A. cylindrocarpa* and a small plant of *A. norvegica* Gunn. with which it has been confused; also characteristic mature fruits × 6, and seeds × 10. See p. 11.

Stellaria crassifolia Ehrh. The Newfoundland range extended south to St. John Bay: springy and mossy glades in spruce and larch swamp, Eastern Point, *Fernald, Long & Fogg*, no. 1680.

Cerastium Fischerianum Seringe. Extended south from the Straits to St. John Bay and Ingornachoix Bay: wooded talus of limestone cliff, Crow's Head, *Fernald, Long & Fogg*, no. 1684; dry peaty and turfy limestone barrens, Gargamelle Cove, no. 1683.

C. terrae-novae Fern. & Wieg. See p. 11, plate 257. Apparently on all the serpentine areas of the West Coast.

The plate shows a small plant, life-size, and seeds × 10.

C. viscosum L. District of Burgeo and La Poile: roadsides, pastures and grassy banks, Burgeo, *Fernald, Long & Dunbar*, no. 26,675, *Fernald, Long & Fogg*, no. 260.

Although recorded by Waghorne and others from Newfoundland, the constant mixture in literature of *C. viscosum* and *C. vulgatum* L. makes it desirable to put a verified station on record.

Lychnis alpina L. To the stations already recorded add Bay of Islands: southerly slopes of dry serpentine ridge, North Arm, *Long & Fogg*, no. 263.

*Silene acaulis L., var. exscapa (All.) DC., forma caulescens (Vaccari) Fiori. Bonne Bay: shelves and talus of diorite cliffs, Western Head, *Fernald, Long & Fogg*, no. 1693.

Var. *exscapa*, the common form in eastern America, has the flowers and fruiting capsules scarcely exserted from the leafy tips. Forma *caulescens* has calyx and capsule of var. *exscapa*, but the flowers well elevated on peduncles rising 1 cm. or more above the leafy mat. See p. 94.

Thalictrum alpinum L.

In its simple, mostly scapose stems and slender racemes and its tiny dark and lustrous upper leaf-surfaces *Thalictrum alpinum* is unique, yet by a singularly innaccurate statement in American keys it would ordinarily be difficult to make a determination of the plant. In the *Synoptical Flora* (i. fasc. 1: 14) *T. alpinum* is said to have "Flowers hermaphrodite"; and in Britton & Brown's *Illustrated Flora* (ii. 86) *T. alpinum* and *T. clavatum* are separated in the key from other species by having "Flowers perfect," while in Trelease's detailed paper on the genus (Proc. Bost. Soc. Nat. Hist. xxiii. 297), upon which later treatments have been largely based, these species are said to have "Flowers all perfect." Nevertheless, *T. clavatum* is, as originally described by De Candolle, ordinarily monoecious and, in spite of the key-character and the description, it is so illustrated in the *Illustrated Flora*. Some herbarium-specimens indicate that it may rarely be dioecious, but perfect flowers are highly exceptional. Similarly, *T. alpinum* is so generally dioecious that monoecious colonies or plants are unusual and hermaphrodite or perfect flowers very exceptional. The dioecious character of *T. alpinum* is well brought out in the figure in the *Illustrated Flora*, although the text calls for "flowers perfect."

Anemone multifida Poir. (var. hudsoniana DC., hardly separable from the typical form). The Newfoundland stations are so few that

the following additional ones are worthy of note. Bonne Bay: limestone cliffs and talus, Tucker's Head, *Fernald, Long & Fogg*, no. 1709; turfy limestone crest (alt. 650 m.), Killdevil, no. 1710. Lower Humber Valley: dominant in dry humus over limestone ledges and shingle, Hannah's Head, no. 1708, well-developed plants with 16 or more heads. See p. 47.

*Cochlearia groenlandica L. Pistolet Bay: wet rocky beaches, Raleigh, *Anne M. Jeffers*, no. 91.

Characteristic of the outer coast of Labrador, but not previously found in Newfoundland where the common species are *C. tridactylites* Banks and *C. cyclocarpa* Blake.

Cardamine pratensis L., var. palustris Wimm. & Grab. Already known from southeastern Newfoundland but not clearly vouched for heretofore from the West Coast. Bay of Islands: along spring-rill in thicket at base of Mt. Moriah, *Fernald, Long & Fogg*, no. 1720. See p. 15.

*C. flexuosa With. Lower Humber Valley: wet springy banks and thickets, Humbermouth, *Fernald, Long & Fogg*, no. 1721; springy and bushy slopes between Marble Mountain and Humbermouth, no. 1722. See p. 16.

A typical Eurasian species, new to North America; clearly indigenous, with characteristic endemic American plants of wet or springy banks. Quickly distinguished from the variable American *C. pensylvanica* Muhl. by its definitely petiolulate leaflets. Although appearing in every way indigenous on the lower Humber, *C. flexuosa* has been collected by Mrs. Ayre in a park at St. John's where it was possibly introduced.

Lesquerella **Purshii** (Wats.), n. comb. *L. arctica*, var. *Purshii* Wats. Proc. Am. Acad. xxiii. 254 (1888) and in Gray, Syn. Fl. N. Am. i.[1] 120 (1895); Fernald, Rhodora, xiii. 223 (1911); Payson, Ann. Mo. Bot. Gard. viii. 157 (1921). Plate 258.

When Watson distinguished the plant of Anticosti as var. *Purshii* he recognized only two points of departure from the Greenland and arctic American *L. arctica* (Wormsk.) Wats.: "Pod somewhat pubescent; septum complete," as contrasted with the glabrous pod and fenestrate septum of the arctic plant. Later, Payson, in his *Monograph of the Genus Lesquerella*, stated in regard to the perforate septum, that "This character is apparently of no value, since specimens of typical *arctica* are at hand that show no perforations."[1] Payson, however, stated that var. *Purshii* (then known from western Newfoundland as well as Anticosti) is a "more slender plant . . . with narrower

[1] Payson, Ann. Mo. Bot. Gard. viii. 157 (1921).

leaves . . . the variety seems to have but 5–6 ovules in each cell, while the species has 6–8."

Since Watson's day, and even since Payson's, the material in the Gray Herbarium has vastly increased; when Payson studied the group we had 13 numbers of the two plants, now we have 45. With the large increase of material it becomes possible better to evaluate the differences and the similarities. As Payson says, the plant of Anticosti and Newfoundland tends to be more slender and to have narrower leaves: the rosette-leaves are narrowly oblanceolate and very slenderly petioled, those of the arctic plant broadly oblanceolate to spatulate. In *L. arctica* the raceme is short and corymbiform or subcorymbiform, with little tendency to elongate, the fruiting pedicels loosely ascending or spreading and commonly arcuate, the longest 1.4–2.6 (av. 1.6) cm. long; in the plant of the Gulf of St. Lawrence the raceme may be subcorymbiform but, when well developed, it becomes an elongate and stiff slender raceme, with ascending to stiffly spreading short and straight pedicels, the longest only 2–16 (av. 8) mm. long. The sepals of *L. arctica* taper gradually to the subacute tip; in *L. Purshii* they are gradually rounded at tip. The petals of *L. arctica* are rather marcescent, enveloping the capsule until it is nearly grown; in *L. Purshii* they quickly shrivel and have usually dropped before the young fruit is much distended. The capsules of *L. arctica* are glabrous, 6–9 mm. long and contain 6–8 seeds in each cell; those of *L. Purshii* oftenest lepidote (though sometimes glabrate) and averaging much smaller, 3.5–7 mm. long, with 4, 5 or 6 seeds in each cell. Although, as Payson says, the usually fenestrate septum of *L. arctica* may be complete, the fenestration is common and the opening large, while in *L. Purshii* the perforation only rarely occurs and it is then smaller than in *L. arctica.*

Differing, at least recognizably, in so many characters and isolated by more than 7 degrees of latitude, the two plants seem to be fairly segregated species. Their differences are summarized below.

L. arctica. Rosette-leaves broadly oblanceolate to spathulate, broad-petioled: raceme corymbiform or subcorymbiform; the fruiting pedicels loosely ascending to spreading, often arcuate, the longest 1.4–2.6 (av. 1.6) cm. long: sepals gradually narrowed to subacute tip: petals subpersistent, often enveloping the nearly grown fruit: capsules glabrous, 6–9 mm. long, with 6–8 seeds in each cell: septum usually fenestrate, the perforation roundish or oval—Greenland and Arctic America, south to Rama (lat. 58° 43′), Labrador.

L. Purshii. Rosette-leaves narrowly oblanceolate, slenderly pet-

ioled: raceme corymbiform to elongate, slender and stiff, with ascending to spreading straight pedicels, the longest 2–16 (av. 8) mm. long: sepals rounded at tip: petals soon shriveling, deciduous before the distension of the fruit: capsules lepidote, sometimes glabrate, rarely glabrous, 3.5–7 mm. long, with 4–6 seeds in each cell: septum usually complete, the perforation, when it occurs (not to be confused with rupturing), narrow and elongate.—Western Newfoundland and Anticosti Island, Quebec. NEWFOUNDLAND: dry gravelly limestone barrens, Burnt Cape, Pistolet Bay, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss*, no. 28,336; dry gravel of limestone barrens, Cook Point, Pistolet Bay, *Fernald & Gilbert*, no. 28,337; dry mixed gravel on crest southwest of Boat Harbor, Straits of Belle Isle, *Fernald, Wiegand & Long*, no. 28,338; gravelly limestone barrens back of Big Brook, Straits of Belle Isle, *Pease & Griscom*, no. 28,334; limestone barrens west of Big Brook, *Long & Gilbert*, no. 28,335; dry gravelly limestone barrens, St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 28,339; dry gravelly or shingly limestone barrens, Old Port au Choix, *Fernald, Long & Fogg*, no. 1724; dry gravelly limestone barrens, Gargamelle Cove, Ingornachoix Bay, *Fernald, Long & Fogg*, no. 1725; limestone barrens, Pointe Riche, *Fernald & Wiegand*, no. 3464; limestone cliffs and talus, Tucker's Head, Bonne Bay, *Fernald, Long & Fogg*, no. 1726; dry limestone barrens, upper slopes and tablelands, alt. 200–300 m., Table Mountain, Port au Port Bay, *Fernald & Wiegand*, no. 3465, *Fernald & St. John*, nos. 10,835, 10,836 and in Pl. Exsicc. Gray. no. 216, *Mackenzie & Griscom*, no. 10,290; dry limestone barrens, Green Gardens, Cape St. George, *Mackenzie & Griscom*. Anticosti Island, QUEBEC: *Pursh;* platières de l'embouchure, Rivière Jupiter, *Victorin & Rolland*, no. 24,851; sur les platières récontes, Riv. Chicotte, *Victorin & Rolland*, no. 27,146; sur les platières, Riv. McKane, *Victorin & Rolland*, no. 27,262.

The close relationship of the arctic species in numerous genera and of their endemic representatives about the Gulf of St. Lawrence with an isolated species of southern South America has repeatedly been pointed out. It is therefore noteworthy that the nearest relative of *Lesquerella arctica* and *L. Purshii* should be South American. As early as 1829, Hooker identified the Andean plant as *Vesicaria arctica:* "nor can I distinguish from *V. arctica,* specimens I have in my Herbarium, gathered in the plains of Mendoza and hills above Cordova, South America, by Dr. Gillies and Mr. Cruikshanks."[1] There has been much confusion of the one to three species of *Lesquerella* in South America and their identity is still rather vague. The Gillies plant, represented in the Gray Herbarium by a full sheet collected in 1825 from "Half-way between Fort San Rafael & El Puerto del

[1] Hook. Fl. Bor.-Am. i. 48 (1829).

Monte" in the Andes is a good match for the original plate of *Vesicaria montevidensis* Eichl. in Mart. Fl. Bras. xiii[1]. 302, t. 67, fig. 2 (1865), said to come from Montevideo. Some authors reduce *Lesquerella montevidensis* (Eichl.) Wats. to *L. mendocina* (Phil.) Kurtz, but the material at hand indicates that Payson is right in keeping them apart. *L. montevidensis* is placed by Payson next to *L. arctica* and *L. Purshii* (*L. arctica*, var. *Purshii*). It has the elongating raceme, ascending pedicels and slightly elongate pods like those of *L. Purshii;* but its leaves incline to be sinuate, its flowers are much larger, the pubescence of the pods is a fine stellate tomentum, and its styles are slightly longer than in *L. Purshii.*

Draba megasperma Fern. & Knowlt. Range in western Newfoundland extended south to St. John Bay: turf overlying limestone, Grassy Island, *Fernald, Long & Fogg,* no. 1731; dry gravelly limestone barrens, Eastern Point and Eddy's (Old Man's) Cove, nos. 1737, 1748½. In eastern Newfoundland known as far south as Notre Dame Bay: rocky shore, Pike's Arm, *Fernald, Wiegand & Bartram,* no. 5458.

D. arabisans Michx., var. orthocarpa Fern. & Knowlt. Extended north from Bay of Islands to Bonne Bay: limestone cliffs and talus, Tucker's Head, *Fernald, Long & Fogg,* no. 1749.

D. rupestris R. Br. The southern known limits in Newfoundland are on Bonne Bay: limestone cliffs near Stanleyville, *Fernald, Long & Fogg,* no. 1727; shelves and talus of diorite cliffs, Western Head, no. 1728. Notre Dame Bay: turfy and rocky crests, Twillingate, *Fernald, Wiegand & Bartram,* no. 5459; exposed ledges, Castle Rocks, Tilt Cove, *Fernald, Wiegand & Darlington,* no. 5460.

Arabis alpina L. General in calcareous soils, either wet or moderately dry, south to Ingornachoix Bay. The typical plant has conspicuous milk-white petals with delicate and obscure veins. On Doctor Hill and about St. John Bay the petals are often firm, greenish-white and coarsely veined. This is

A. alpina, forma **phyllopetala**, f. nov., petalis firmis viridiscentibus valde venosis.—Newfoundland: shaded shelves of limestone cliff, Crow's Head, St. John Bay, July 28, 1929, *Fernald, Long & Fogg,* no. 1753 (type in Gray Herb.); thickets on quartzite gravel along brook, Deep Gulch, Doctor Hill, August 7, 1929, no. 1754.

A. Drummondi Gray. Additional station on Bonne Bay: turfy slopes below limestone crest (alt. 650 m.), Killdevil, *Fernald, Long & Fogg,* no. 1756.

In view of the occurrence of *Arabis Drummondi* in New England at low altitudes it is a striking fact that in western Newfoundland it is known only on the high limestone escarpments and crests of the Highlands of St. John and of Killdevil.

*Drosera obovata Mert. & Koch. Bonne Bay: with *D. anglica,*

intermedia and *rotundifolia* in peaty borders of ponds in the barrens at about 365 m., Lookout Mt., *Fernald, Long & Fogg*, no. 1759; with the same associates, often forming pure colonies of considerable extent, wet peaty bog-barrens at 400–550 m. alt., tableland of Lookout Mt., no. 1760.

The first record, apparently, for North America. *D. obovata* is usually considered a hybrid of *D. anglica* and *D. rotundifolia.* The Lookout Mt. plant is abundant in spots, sometimes more so than its associates. See p. 87.

D. LINEARIS Goldie. To the single known Newfoundland station (on Blomidon, Bay of Islands) should be added the following extensive one. POINTE RICHE: quagmire-margin of pool in limestone barrens, *Fernald, Long & Fogg*, no. 1761, the plant making essentially continuous turf about a single pool, hundreds of other neighboring and apparently similar pools quite lacking it.

*SARRACENIA PURPUREA L., forma HETEROPHYLLA (Eaton) Fern. RHODORA, xxvi. 174 (1922). BONNE BAY: open upland marsh, *Harlow Bishop*, no. 336; open savannah near mouth of Main River, *Fernald, Long & Fogg*, no. 1762, all the pale form, no purple flowers seen.

?*SAXIFRAGA ADSCENDENS L.

In the Roemer herbarium at the British Museum, received through Shuttleworth, there is a specimen of characteristic *Saxifraga adscendens* (the identification confirmed for me by Mr. A. J. Wilmott) originally labeled: "*Saxifraga tricuspidata*," with the pencilled data: "Grönlandia, Terra nova," and the pencilled name of the author (of *S. tricuspidata*) "Rottb." Shuttleworth has added: "vix Rottb. an *petraea* vel *adscendens* Vahl" and "Herb. Roem." *Saxifraga tricuspidata* is, of course, a characteristic plant of Greenland and northern Labrador (not yet definitely known from Newfoundland) and the specimen of *S. adscendens* from "Grönlandia, Terra nova" may have accidentally replaced one of *S. tricuspidata.* On the other hand, *S. adscendens* is a western European plant which might well be in Newfoundland;[1] *S. adscendens* is, likewise, found in cordilleran North America, consequently, since hundreds of other cordilleran species are isolated in Newfoundland, it is to be expected in the latter region.

*PARNASSIA CAROLINIANA Michx. ST. JOHN BAY: wet bog back of Eddy's (Old Man's) Cove, *Fernald, Long & Fogg*, no. 1778; wet boggy margin of pond, Back (or Bustard) Cove, no. 1779. BONNE BAY: alluvial islands and shores at mouth of Main River, no. 1780.

An attractive but long expected addition to the flora of western

[1] See Fernald, RHODORA, xxviii. 50 (1926) and Proc. Intern. Congr. Pl. Sci. ii. 1501–1506 (1929).

Newfoundland, since it was known eastward to the tip of the Gaspé Peninsula and to Anticosti and the Mingan Islands.

Ribes hirtellum Michx., var. saxosum (Hook.) Fern. Rhodora, xiii. 76 (1911). A rather striking extreme, with leaves of the fertile branches rounded to cordate at base. Probably somewhat general on the West Coast. The following collections are at hand. Pointe Riche: bushy talus of limestone sea-cliffs at base of the Point, *Fernald, Long & Fogg*, no. 1782. Bay of Islands: wet woods, Crabb's, June 12, 1896, *Waghorne*.

Amelanchier Fernaldii Wiegand, Rhodora, xxii. 149 (1920). Range extended north to St. John Bay: peaty thicket bordering limestone barrens, Old Port au Choix, *Fernald, Long & Fogg*, no. 1792; shrubs 0.5–1 m. high. See p. 56.

A. laevis Wiegand, Rhodora, xiv. 154, t. 96, fig. 7 (1912). Range on the West Coast extended north to Bonne Bay: talus of limestone cliff opposite Lomond, *Fernald, Long & Fogg*, no. 1791.

Crataegus laurentiana Sarg. Very rare and local; the following are the known stations. Valley of the Exploits: sandstone ridges and banks, Rushy Pond, and ledges and gravel by the river, Bishop Falls, *Fernald, Wiegand & Darlington*, nos. 5642, 6606. Bay of Islands: brought from wild thicket at Hugh's Brook to garden of James Pennell, Esq. at Curling, *Fernald, Long & Fogg*, no. 1794. See p. 49.

*Potentilla sterilis (L.) Garcke (*P. Fragariastrum* Ehrh.). Avalon Peninsula: exact locality not definitely known, 1928, *A. M. Ayre*.

Potentilla sterilis is a noteworthy addition to the flora of North America. Unfortunately, Mrs. Ayre, in collecting it, was not fully aware of the significance of the discovery and there is some question as to the exact source of the specimens. In the winter of 1930–31, while going over with Mrs. Ayre a large collection of the very variable *Fragaria virginiana* marked "Strawberries near Murray's Pond, all wild," I found in the series two individuals (now in the Gray Herbarium) of most characteristic *Potentilla sterilis*. Mrs. Ayre had drawn a similar plant, probably from cliffs at Brigus. Subsequent search has, thus far, failed to rediscover the exact spots whence the collections came. *P. sterilis* is a typical plant of central, western and southern Europe; and its discovery in Newfoundland adds another to the long series of western Eurasian types which are apparently also indigenous there.

P. pectinata Raf. To the very few Newfoundland stations add Bay of Islands: crests of sandstone sea-cliffs, Woody Island, *Fernald, Long & Fogg*, no. 299. See p. 9.

P. norvegica L., var. labradorica (Lehm.) Fern. Rhodora,

xxviii. 213 (1926). Range extended from the Straits of Belle Isle south to BONNE BAY: shaded limestone rocks near crest (alt. 650 m.), Killdevil, *Fernald, Long & Fogg*, no. 1801. See p. 89.

*P. ERECTA (L.) Hampe (*P. Tormentilla* Neck.). AVALON PENINSULA: a large patch in moss, Quidi Vidi, August 26, 1930, July, 1931, *A. M. Ayre.*

Potentilla erecta, more familiarly known in Europe as *P. Tormentilla,* is as significant an addition to the indigenous flora of southeastern Newfoundland as *P. sterilis* (see above) or as were some other typical western Eurasian species now long known from the Avalon Peninsula: *Potamogeton polygonifolius* Pourret, *Festuca capillata* Lam., *Glyceria fluitans* (L.) R. Br., *Nardus stricta* L., *Juncus bulbosus* L., *Montia rivularis* C. C. Gmel., *Ranunculus hederaceus* L., *R. Flammula* L., *Potentilla procumbens* Sibth., *Pedicularis sylvatica* L., etc.

*P. ANSERINA L., forma **sericea** (Hayne), comb. nov. *P. Anserina,* var. *sericea* Hayne, Arzneigew. iv. 31 (1816). *P. Anserina, β. concolor* Wallr. Sched. Crit. i. 226 (1822). *P. Anserina, β. holosericea* Gaud. Fl. Helv. iii. 405 (1828). *P. Anserina, α. argentea* Neilr. Fl. Nied. Österr. 909 (1859). *P. Anserina α. unicolor* Schur, Enum. Pl. Transs. 189 (1866). *P. sericea* (Hayne) Zimmeter, Eur. Art. Gatt. Pot. 6 (1884), not L. *P. concolor* (Wallr.) Zimmeter, Bot. Kal. 1887: 66 (1887). *Argentina Anserina concolor* (Wallr.) Rydb. Mon. N. Am. Pot. 160 (1898). *A. argentea* Rydb. Bull. Torr. Bot. Cl. xxxiii. 143 (1906). *A. Anserina sericea* (Hayne) Piper, in Piper & Beattie, Fl. Se. Wash. 142 (1914). *P. Anserina,* var. *argentea* (Rydb.) Jepson, Man. Fl. Pl. Calif. 485 (1925), not Neilr. (1859) as to type.—BAY OF ISLANDS: upper border of gravelly sea-beach, Governor Island, *Fernald, Long & Fogg,* no. 300.

In Newfoundland, eastern Canada and northern New England *Potentilla Anserina* (var. *vulgaris* Hayne), with the upper leaf-surfaces deep-green, passes as it gets into drier habitats (like the upper borders of beaches) by a perfect transition into the very striking extreme with the upper surfaces silvery-sericeous. The latter extreme is at best a mere form, certainly not a true variety. It is quite parallel with *P. palustris,* f. *subsericea* (Becker) Wolf. Although Rydberg set up his *Argentina argentea* as an American species quite apart from the Old World *P. Anserina* var. *argentea* Neilr., I am quite incapable of finding the differences. Several Eurasian collections seem to me inseparable from the American plants.

DRYAS INTEGRIFOLIA Vahl, forma **canescens** (Simmons), comb. nov. *D. integrifolia,* var. *canescens* Simmons, Vasc. Pl. Fl. Ellesmereland, 46 (1906).—The Newfoundland stations are POINTE RICHE: scarce (and sterile), on peaty and turfy limestone barrens, with the abundant and typical form with green upper surfaces of the leaves,

Fernald, Long & Fogg, no. 1812. Port au Port Bay: dry exposed ledges and shingle on the limestone tableland, alt. 200–300 m., Table Mt., *Fernald, Wiegand & Kittredge*, no. 3598, *Fernald & St. John*, no. 10,846, *Mackenzie & Griscom*, no. 10,317. Cape St. George: dry limestone barrens, local, Green Gardens, *Mackenzie & Griscom*, no. 11,078.

Dryas integrifolia, f. *canescens* is quite parallel with *Potentilla Anserina*, f. *sericea*, *P. palustris*, f. *subsericea*, and numerous other cases. It is likely to be found in the most arid situations throughout the range of *D. integrifolia*. Abundant collections from Greenland indicate that such is the case there, just as it is in western Newfoundland.

Alchemilla vulgaris L., var. vestita (Buser) Fern. & Wiegand, Rhodora, xiv. 233 (1912). *A. minor* Huds. Extended south on the West Coast to Bonne Bay: damp thickets under limestone crest (alt. 650 m.), Killdevil, *Fernald, Long & Fogg*, no. 1821.

On the mountains of western Newfoundland *Alchemilla vulgaris*, var. *vestita* and var. *filicaulis* (Buser) Fern. & Wieg. are both conservative and rather localized plants of remote subalpine habitats. Nevertheless, at some places on the island they are both inclined to become aggressive weeds. Mrs. Ayre sends var. *vestita* from St. John's, where it is a "terrible weed" in lawns, etc., just as typical *A. vulgaris* has become an almost indestructible pest in western Nova Scotia.

Prunus virginiana L. The Choke Cherry extends north on the West Coast to Bonne Bay: swales and margins of wet thickets along Winterhouse Brook, *Fernald, Long & Fogg*, no. 1825.

Astragalus eucosmus Robinson. Our first station on the West Coast south of Pistolet Bay is on Bay of Islands: turfy spots on slaty calcareous talus, Cutwater Head, *Fernald, Long & Fogg*, no. 1827. See p. 50.

Oxytropis foliolosa Hook. The first station on the West Coast south of Pistolet Bay is on Bay of Islands: turfy spots on slaty calcareous talus, Cutwater Head, *Fernald, Long & Fogg*, no. 1828. See p. 50 and map 3.

It will be noted that neither *Oxytropis foliolosa* nor *Astragalus eucosmus* have been found on the West Coast of Newfoundland between Pistolet Bay and the Middle Arm of Bay of Islands. In describing our very hurried and wholly superficial botanizing on Cutwater Head (p. 50), I noted the occurrence there of a new *Taraxacum* with extraordinarily large heads, a plant collected also in evening light of the same day on the cliff at neighboring Cod Cove. This *Taraxacum* (to be described and illustrated in Part III), like the *Astragalus* and the *Oxytropis*, is likewise known in western Newfoundland only

on Pistolet Bay and the Middle Arm of Bay of Islands. Whatever the peculiar factors, as yet not wholly apparent (probably similarity of rock), which concentrate at points 200 miles apart these highly localized species, it is probable that, if our incidental five-minute landing on Cutwater Head had been extended to half-a-day, many other specialties of Pistolet Bay might have been found: such plants as *Carex capitata* L., *Cerastium Regelii* Ostenf., *Ranunculus pedatifidus* J. E. Sm., var. *leiocarpus* (Trautv.) Fern., *Draba nivalis* Lilj., *Parnassia Kotzebuei* C. & S., *Potentilla usticapensis* Fern., *Astragalus stragulus* Fern., *Arctostaphylos rubra* (Rehder & Wilson) Fern., *Bartsia alpina* L., *Antennaria eucosma* Fern. & Wieg., *A. vexillifera* Fern., *Arnica plantaginea* Pursh and *Crepis nana* Richardson. Here is a real challenge and an opportunity for a worth-while vacation for a pair of intelligent cliff-climbers.

OXYTROPIS JOHANNENSIS Fern. RHODORA, xxx. 145, t. 173 (1928). To the few Newfoundland stations already recorded add BONNE BAY: limestone rocks near crest (alt. 650 m.), Killdevil, *Fernald, Long & Fogg*, no. 1831.

O. TERRAE-NOVAE Fern. l. c. 147, t. 174 (1928).

Apparently somewhat general on dry calcareous shingle and exposed limy ledges from the eastern entrance of Hudson Strait to southwestern Newfoundland (MAP 22). This type of distribution is shown by *Arnica terrae-novae* and *A. plantaginea* (to be considered later) and several other species.

MAP 22. Range of OXYTROPIS TERRAE-NOVAE.

HEDYSARUM ALPINUM L. Our only stations (as yet) between Cow Head and the limestone barrens of Port au Port Bay are on Bonne Bay and Bay of Islands. BONNE BAY: limestone rocks near crest (alt. 650 m.), Killdevil, *Fernald, Long & Fogg*, no. 1835; basaltic talus near mouth of Wallace's Brook south of Bonne Bay, no. 1834. See p. 94. BAY OF ISLANDS: turfy spot on slaty calcareous talus, Cutwater Head, no. 1832. See p. 50.

*H. ALPINUM L., var. AMERICANUM Michx., forma **albiflorum** (Standley), comb. nov. *H. americanum* (Michx.) Britton, f. *albiflorum* Standley, Field Mus. Pub. Bot. viii. 15 (1930).—The only Newfound-

land collection of the albino is from Valley of the Exploits: ledges and talus, north bank of the river below the falls, Grand Falls, *Fernald, Wiegand, Bartram & Darlington*, no. 5801.

*Vicia Cracca L., var. sericea Peterm. This very striking silvery-sericeous extreme was found on Bonne Bay: gravelly beach near old lumber camp (obviously introduced), Beachy Cove, *Fernald, Long & Fogg*, no. 1837.

Lathyrus japonicus Willd., var. aleuticus (Greene) Fern. Rhodora, xxxiv. 179 (1932). Extending locally south to Notre Dame Bay and to Port au Port Bay. Frequently producing cleistogamous flowers and reniform fruits, resembling those of *Amphicarpa bracteata*.[1]

[1] Amphicarpa **bracteata** (L.), comb. nov. *Glycine bracteata* L. Sp. Pl. ii. 754 (1753). *G. monoica* L. Sp. Pl. ed. 2, ii. 1023 (1763). *A. monoica* (L.) Ell. Journ. Acad. Phil. i. 373 (1818). *Falcata comosa* Britt. in Britt. & Br. Ill. Fl. ii. 334, fig. 2225 (1897), not *Glycine comosa* L. Sp. Pl. ii. 754 (1753).

In eastern North America we have two well marked species of *Amphicarpa:* (1) the very common plant with filiform stems, slight or short pubescence and few whitish to pale-lilac petaliferous flowers, the plant called for many years *A. monoica* (L.) Ell. (1818) and described and illustrated in Britton & Brown as *Falcata comosa* (L.) Kuntze (1891); and (2) the much coarser villous plant with longer pubescence and the deeper purple flowers more numerous. This plant, no. 2, is *A. Pitcheri* T. & G. (1838).

Although by Britton & Brown *Falcata comosa* (L.) Kuntze, based on *Glycine comosa* L. (1753), is made to include as a synonym *Amphicarpa monoica* (L.) Ell., based on *Glycine monoica* L. (1763), while *Falcata Pitcheri* (T. & G.) Kuntze is maintained as a separate species, it is to be noted that in 1753 Linnaeus clearly recognized the two American species, basing them both on characteristic specimens of Clayton's and on clear diagnoses by Gronovius. Both the Linnean species were on the same page (754) of Species Plantarum (1753): (1) *Glycine comosa*, with the original Linnean diagnosis "GLYCINE foliis ternatis hirsutis, racemis lateralibus" and (2) *G. bracteata* with the original Linnean diagnosis "GLYCINE foliis ternatis nudiusculis, caule piloso, racemis pendulis, bracteis ovatis." Both go back directly to the fuller accounts of Gronovius and, therefore, the Clayton specimens (no. 182 as type of *G. comosa*, no. 592 as type of *G. bracteata*) which formed the bases of the Gronovian and, following him, the Linnean descriptions; and both came from "Virginiae *madidis umbrosis*," the habitats given by Clayton and Gronovius. In case of *G. comosa* Linnaeus, following Gronovius, cited also the *Phaseolus marianus scandens* of Petiver, which is now unidentifiable but presumably correctly placed with Clayton, no. 182.

Since the Gronovian descriptions upon which Linnaeus based his two species, *Glycine comosa* and *G. bracteata*, so well differentiate our two species and since Linnaeus would presumably not have divided into two species the more slender plant, as has been generally assumed, it seemed desirable to study the types in connection with a series of typical American plants. In the summer of 1930 Mr. Bayard Long and I made such a study at the British Museum. The type of *Glycine comosa* is beautifully characteristic *Amphicarpa Pitcheri*, so well defined by Gronovius: "late scandens, floribus coeruleis in racemos parvos ad genicula congestis, foliis hirsutis." Consequently, A. Pitcheri T. & G. *should be called* A. comosa (L.) G. Don in Loud. Hort. Brit. 314 (1830).

Glycine bracteata L. (1753) was renamed by Linnaeus in 1763 *G. monoica*, because he thought this new name more descriptive of a plant notable for its two types of flowers and fruits; and by the old Kew Rule the correct name (the first combination of generic and specific names) was *Amphicarpa monoica* (L.) Ell. The type of *G. bracteata*, therefore of *G. monoica*, is clearly the slender plant long called *Amphicarpa monoica* and well defined by Linnaeus (following Gronovius) with "foliis . . . nudiusculis . . . *Alae & Carina albae, Vexillo pallide violaceo.*" Consequently, as indicated in the opening paragraph, Amphicarpa monoica (L.) Ell. must be called A. bracteata (L.), comb. nov.

L. JAPONICUS Willd., var. GLABER (Ser.) Fern. l. c. 181 (1932). Extending northward on the West Coast to Cow Head.

*L. JAPONICUS Willd., var. GLABER, f. ACUTIFOLIUS (Bab.) Fern. l. c. 182 (1932). The only American collection seen is from BONNE BAY: upper border of beach, White Point, *Fernald, Long & Fogg*, no. 1840.

L. JAPONICUS Willd., var. PELLITUS Fern. l. c. 183 (1932). Extending north to Notre Dame Bay and to St. John Bay.

*L. PRATENSIS L. LOWER HUMBER VALLEY: springy glades in spruce woods between Marble Mountain and Humbermouth, *Fernald, Long & Fogg*, no. 1844.

As stated on p. 15, *Lathyrus pratensis* in the mossy glades in typical spruce forest of the Lower Humber has every appearance of a native plant. It has as associates or near neighbors in the natural glades and woodlands other European species (*Cardamine flexuosa* With., *Linum catharticum* L., *Scrophularia nodosa* L. and *Cirsium palustre* (L.) Scop.) which, likewise, have every aspect of indigenous species. With them are the usual circumpolar or amphigean species of the Canadian forest-flora (*Thelypteris Dryopteris* (L.) Slosson and *T. Phegopteris* (L.) Slosson, *Botrychium virginianum* var. *europaeum* Ångstr., *Cinna latifolia* (Trev.) Griseb., *Carex capillaris* L. and *lepidocarpa* Tausch, *Streptopus amplexifolius* (L.) DC., *Caltha palustris* L., *Pyrola minor* L., etc.), as well as the usual endemic American species of wet calcareous woods (*Cystopteris bulbifera* (L.) Bernh., *Taxus canadensis* Marsh., *Carex stipata* Muhl., *Habenaria dilatata* (Pursh) Gray, *Listera convallarioides* (Sw.) Nutt., etc., etc.). These are not weeds and our conviction was, that *Lathyrus pratensis* and its other European associates are as definitely indigenous in western Newfoundland as are the endemic American species with which they are found.

In this connection it is worth while to record some other stations for *Lathyrus pratensis*. On PRINCE EDWARD ISLAND: springy meadow, Rocky Point, Queens Co., *Fernald & St. John*, no. 7709. In NOVA SCOTIA: border of boggy swale, Springhill Junction, *Pease & Long*, no. 21,732. Although an occasional introduction along railroads and roadsides on the continent of North America, *L. pratensis* may prove to be quite as indigenous in Prince Edward Island and Nova Scotia as in Newfoundland.

LINUM CATHARTHICUM L. Known in Newfoundland from the LOWER HUMBER VALLEY: wet slaty border of ditch, near Humbermouth, July 4, 1910, *Fernald, Wiegand & Kittredge*, no. 3654; railway gravel near Humbermouth, July 18, 1910, no. 3655; wet springy banks and thickets, Humbermouth, *Fernald, Long & Fogg*, no. 1845; dry humus over limestone ledges and shingle, Hannah's Head, no. 1846;

damp limestone gravel between Marble Mt. and Humbermouth, *Fernald & Long*, no. 1847.

See discussion on p. 15 and under *Lathyrus pratensis* (preceding). Although Wiegand and I, in 1910, took *Linum catharthicum* to be a railroad introduction, it has not spread in 20 years as a railroad weed. It is quite possible that the railroad merely invaded its natural area.

*Empetrum nigrum L. f. purpureum (Raf.) Fern. Rhodora, xxv. 83 (1923). Bonne Bay: abundant with the common black-fruited form, peaty and turfy upper quartzite slopes (alt. 600–650 m.), Killdevil, *Fernald, Long & Fogg*, no. 1851. See p. 89.

The combination *Empetrum nigrum*, f. *purpureum* was independently made by R. Good, Trans. Linn. Soc. xlvii. 519 (1927), Good obviously overlooking its publication in 1923.

Elatine minima (Nutt.) Fisch. & Meyer. See Fernald, Rhodora, xix. 13 (1917). To the two recorded stations in Newfoundland add from District of Burgeo and La Poile: sandy and gravelly margin of pond, Burgeo, *Fernald, Long & Fogg*, no. 326. See p. 13.

Viola palustris L. To the stations on the Straits of Belle Isle add from Highlands of St. John: springy meadow on quartzite slope near head of Yellow Brook, and slopes, ledges and gravel near head of Deep Gulch, Doctor Hill, *Fernald, Long & Fogg*, nos. 1862–1864. See p. 58.

*Epilobium angustifolium L., var. macrophyllum (Hausskn.) Fern. Rhodora, xx. 4 (1918). Highlands of St. John: wet quartzite ledges and gravel along brook, Deep Gulch, Doctor Hill, *Fernald, Long & Fogg*, no. 1872.

The only other known stations in eastern North America are on the Magdalen Islands. See p. 58.

E. Pylaieanum Fern. Rhodora, xxvii. 33 (1925). To the four stations originally recorded add the following. District of Burgeo and La Poile: wet moss and peat on gneiss hills, Sand Bank and Burgeo, *Fernald, Long & Fogg*, nos. 331, 332. See p. 12.

In view of the difficulty of the genus *Epilobium* and the seeming restriction of *E. Pylaieanum* to southernmost Newfoundland, it seems desirable to illustrate it. Plate 259 shows well-developed plants, life-size, and characteristic calyx, × 6, and seed, × 10.

E. wyomingense Nelson. To the few recorded Newfoundland stations add from Bay St. John: wet bog back of Eddy's (Old Man's) Cove, *Fernald, Long & Fogg*, no. 1873.

E. davuricum Fisch. To the few recorded stations add the following: St. John Bay and Ingornachoix Bay: damp open depressions in limestone barrens, Eastern Point and bare wet peaty depressions, Pointe Riche, *Fernald, Long & Fogg*, nos. 1877, 1878.

E. boreale Hausskn. Newfoundland range extended south to

CERASTIUM TERRAE-NOVAE: FIG. 1, small plants, × 1, from Bonne Bay, Newfoundland; FIG. 2, seeds, one showing ruptured testa, × 10, from the TYPE, Blomidon, Newfoundland.

LESQUERELLA ARCTICA: FIG. 1, small plant, × 1, from Greenland; FIG. 2, fruit, × 1, from Greenland; FIG. 3, shriveled flower, showing lance-acuminate sepals, × 4, from Greenland.

L. PURSHII: FIG. 4, small plant, × 1, from Newfoundland; FIG. 5, fruit, × 1, from Newfoundland; FIG. 6, flower, showing oblong, obtuse sepals, × 4, from Newfoundland.

Bonne Bay: damp thicket under limestone crest (alt. 650 m.), Killdevil, *Fernald, Long & Fogg*, no. 1881.

E. lactiflorum Hausskn. To the stations already recorded add the following. Highlands of St. John: wet quartzite ledges and gravel along brook, Deep Gulch, Doctor Hill, *Fernald, Long & Fogg*, no. 1882. Bonne Bay: damp thicket under limestone crests (alt. 650 m.), Killdevil, *Fernald, Long & Fogg*, no. 1884.

Oenothera perennis L. The northern limit in western Newfoundland seems to be on Bonne Bay: scarce, along trail in spruce woods and thickets, slope of Lookout Mt., *Fernald, Long & Fogg*, no. 1887.

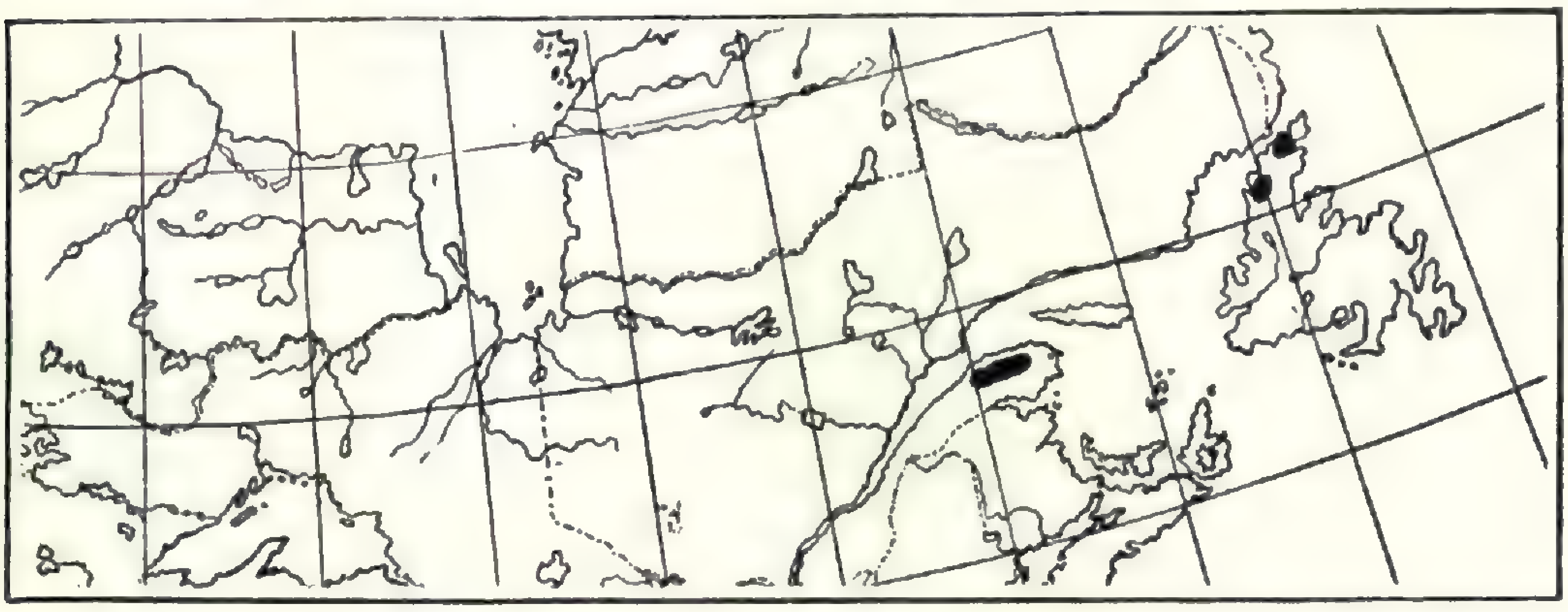
Conioselinum pumilum Rose. In Newfoundland apparently confined to the serpentines of the West Coast and to the north side of Notre Dame Bay. Notre Dame Bay: boggy places on hill southwest of Tilt Cove and border of Castle Pond, Tilt Cove, *Fernald, Wiegand & Darlington*, nos. 5961, 5962. Bonne Bay: serpentine tablelands, alt. about 380 m., *Fernald, Wiegand & Kittredge*, no. 3788; damp humus on serpentine gravel, slopes (above 300 m.) and summit (alt. 710 m.), The Tableland, *Fernald, Long & Fogg*, no. 1895. Bay of Islands: wet depressions and borders of rills, slopes and crests of serpentine ridge, North Arm, *Long & Fogg*, no. 347; serpentine tableland, alt. 550 m. and slopes, Blomidon, *Fernald & Wiegand*, nos. 3785–3787. See pp. 10, 83.

Angelica laurentiana Fern. Rhodora, xxviii. 222 (1926). Abundant at low altitudes about St. John Bay: very abundant (dominant) on Grassy Island, *Fernald, Long & Fogg*, no. 1899, and on Savage's Island, and frequent in clearings about Old Port au Choix. See p. 60.

Phyllodoce caerulea (L.) Bab. To the very few known Newfoundland stations add the following. Highlands of St. John: peat on quartzite slopes, head of Deep Gulch, Doctor Hill, *Fernald, Long & Fogg*, no. 1917. Bonne Bay: peaty and turfy upper quartzite slopes (alt. 600–650 m.) Killdevil, *Fernald, Long & Fogg*, no. 1918.

Vaccinium nubigenum Fernald, Rhodora, x. 53 (1908). Plate 260. To the recorded stations add the following from Highlands of St. John: peaty quartzite slopes, Deep Gulch, Doctor Hill, *Fernald, Long & Fogg*, nos. 1936, 1937. See p. 58.

In view of the very local occurrence (map 23) of *Vaccinium nubige-*



Map 23. Range of Vaccinium nubigenum.

num it is desirable to show its habit. Anthers of the two related species (*V. cespitosum* Michx. and *V. ovalifolium* Sm.) are shown for comparison. As stated on p. 58, *V. ovalifolium* in eastern America is always past anthesis when *V. nubigenum* (likewise *V. cespitosum*) is coming into bloom.

PRIMULA EGALIKSENSIS Wormsk. Extended slightly southward to INGORNACHOIX BAY: turfy borders of limestone beach and dry gravelly limestone barrens, Gargamelle Cove, *Fernald, Long & Fogg*, nos. 1952, 1953 (the latter exceptional in growing in *dry* gravel, consequently with scarcely developed scapes).

*ANDROSACE SEPTENTRIONALIS L. BONNE BAY: limestone talus, Tucker's Head, *Fernald, Long & Fogg*, no. 1954. See pp. 81, 96 and MAP 5.

Only two plants were found, one in fruit, the other a sterile rosette. These, presumably, were chance survivors of a colony which had become much depleted through failure to fruit during a series of adversely cold summers (see pp. 4, 95–97). The map has a single station in northwestern Greenland. So far as I can find, *Androsace septentrionalis* has never been recorded from Greenland. It and some other plants, not yet listed from Greenland, were collected on the Crockerland Expedition by Dr. Ekblaw. The sheet in the Gray Herbarium bears the data: dry warm gravel slope, Etah, July 15, 1915, *W. Elmer Ekblaw*. Dr. Ekblaw collected abundant material, but his Etah station and several from adjacent northeastern Ellesmereland are the only ones yet known in eastern Arctic America.

LYSIMACHIA TERRESTRIS (L.) BSP. Range in western Newfoundland extended north to BONNE BAY: gravel along Deer Brook, *Fernald, Long & Fogg*, no. 1955.

At this northern outpost of the species the plants, in late August, were all sterile and only 1–2 dm. high.

FRAXINUS NIGRA Marsh. Range on the West Coast extended north to BONNE BAY: talus of limestone cliff opposite Lomond, *Fernald, Long & Fogg*, no. 1958.

BARTONIA PANICULATA (Michx.) Muhl., var. IODANDRA (Rob.) Fern. RHODORA, xxiii. 228 (1922). Range on the West Coast extended north to BONNE BAY: wet peaty barrens at about 365 m., Lookout Mt., *Fernald, Long & Fogg*, no. 1962.

The migration of *Bartonia paniculata* (extending southward along the Coastal Plain to Louisiana) between New Jersey and Newfoundland, or *vice versa*, is well brought out by the map of its range northeast of New Jersey (MAP 24). The Newfoundland plant is all var. *iodandra*.

MYOSOTIS LAXA Lehm. Range in western Newfoundland extended

Map. 24. Northeastern Range of Bartonia paniculata (including Varieties).

north to Bonne Bay: swales on alluvial islands and shores at mouth of Main River, *Fernald, Long & Fogg*, no. 1965.

Prunella vulgaris L., var. lanceolata (Bart.) Fern. Rhodora, xv. 183 (1913). Range extended north to Bonne Bay: spruce woods and thickets, slope of Lookout Mt., *Fernald, Long & Fogg*, no. 1968 (pilose form); talus of limestone cliff opposite Lomond, no. 1969 (glabrescent form).

Lycopus uniflorus Michx. The northern known limits in Newfoundland are on Notre Dame Bay, East Branch of the Humber and Bonne Bay. Notre Dame Bay: Barred Islands, August 28, 1903, *Sornborger*. Bonne Bay: springy meadow, Woody Point, *Fernald, Long & Fogg*, no. 1973.

Scrophularia nodosa L. Rather general on calcareous slopes and in thickets and borders of woods on the Lower Humber and Humber Arm of Bay of Islands: wet place, Meadows, July 4, 1895, *Waghorne;* rocky bank, in open place just above tidewater, Bay of Islands (Humbermouth), 1908, *Eames & Godfrey*. no. 8051; rich woods, Wild Cove, 1910, *Fernald & Wiegand*, no. 3940; abundant in gravelly thicket, river-bank between Mt. Musgrave and Humbermouth, 1910, *Fernald & Wiegand*, no. 3939; crevices of dry limestone ledges, Hannah's Head, 1929, *Fernald, Long & Fogg*, nos. 1977, 1978. Also Avalon Peninsula: rocky places, Beachy Cove and Murray's Pond, *A. M. Ayre*.

Scrophularia nodosa (see p. 16), apparently inseparable from the European plant, is certainly indigenous along the lower Humber and about Humber Arm. It is a characteristic species of thickets, borders of woods and rocky slopes, just as are its endemic North American counterparts on the continent. Mrs. Ayre's discovery of the plant in rocky places on the Avalon Peninsula suggests that it may be looked for in many parts of the Island.

Mimulus moschatus Dougl. Range in western Newfoundland extended north to Bonne Bay: springy ditch, Shoal Brook, *Fernald, Long & Fogg*, no. 1980.

*Veronica officinalis L., var. Tournefortii (Vill.) Reichenb.

This very definite small extreme of *Veronica officinalis* is characterized by leaves only 1–3 cm. long and 4–17 mm. wide; by filiform peduncles much longer than their subtending leaves; by linear-cylindric, very lax and flexuous racemes; by blue-violet corollas with oblong or narrowly elliptic lobes and by capsules as broad as or broader than long. It abounds in coniferous woods and thickets, on peaty knolls and in sphagnous bogs in southeastern Newfoundland, is less common in western Newfoundland, and is frequent on Prince Edward Island and Cape Breton, often to the exclusion of the coarser plant which, following Reichenbach, I am treating as typical *V. officinalis:* the plant with coarser leaves, stouter and mostly shorter

peduncles, denser racemes, lilac-blue or lavender corollas with broader lobes, and capsules about as broad as long.

The American specimens of var. TOURNEFORTII examined by me are the following. NEWFOUNDLAND: roadside, St. John's, July 31, 1894 ("exposed form"), *Robinson & Schrenk;* woods, St. John's, August 4, 1894 ("shaded form"), *Robinson & Schrenk;* covering knolls in dry spruce woods, St. John's, *Fernald & Wiegand,* no. 6147; damp mossy or turfy hollows on hill south of St. John's, *Fernald & Wiegand,* no. 6148; dry banks, St. John's, *Fernald & Wiegand,* no. 6149; boggy places along Waterford R., between Waterford Bridge and St. John's, *Fernald & Wiegand,* no. 6150; border of damp spruce thicket on South Hill, *Fernald, Long & Dunbar,* no. 27,015; rocky slopes of Joan Plain's Hill, Bay Bulls, *Fernald, Long & Dunbar,* no. 27,016; Salmonier, August, 1885, *Roland Thaxter,* 1928, *A. M. Ayre;* rocky places, Murray's Pond, 1928, *A. M. Ayre;* moist woods near Topsail, *Howe & Lang,* no. 1224; gravelly thicket, Killigrew's, *Fernald & Wiegand,* no. 6151; damp gravelly slopes near Goose Pond, Whitbourne, *Fernald, Long & Dunbar,* no. 27,017; woods and thickets on slaty brookside, Curling, *Fernald, Long & Fogg,* no. 1984. PRINCE EDWARD ISLAND: grassy border of woods, Charlottetown, *Fernald & St. John,* no. 8008; dry woods, Rocky Point, *Fernald, Long & St. John,* no. 8009; dry woods and recent clearings, St. Dunstan's, *Fernald & St. John,* no. 11,178. NOVA SCOTIA: Louisburg, *J. Macoun,* no. 19,979.

(To be continued)

NOTES ON MISSOURI PLANTS[1]

JULIAN A. STEYERMARK

DURING the collecting seasons of 1931–32 the writer visited a number of regions in Missouri which hitherto have never been botanically explored or else little investigated. These places have turned up such a number of interesting finds,—new or rare in the state, or extensions of ranges,—that the writer desires to place them on record. Although other species constituting interesting range extension were collected in addition to those here mentioned, only the most significant discoveries are recorded.

PASPALUM FLORIDANUM Michx. This, a species of the Coastal Plain from Virginia and Florida to Texas, and extending inland to Oklahoma and Missouri, has in Missouri been known only from the southwestern part of the state in Jasper and Barton counties. The writer collected it in 1932 on a sandy prairie in Mississippi county in southeastern Missouri.

[1] Printed with aid of a grant to RHODORA from the National Academy of Sciences.

Panicum Lindheimeri Nash, var. septentrionale Fernald. Collected by the writer in 1932 on dry rocky (porphyritic trachyte) slopes of a canyon along the Little St. Francois river in Madison Co. This variety has hitherto been known from Taney and Shannon counties in the southern Ozark region.

Panicum sphaerocarpon Ell. Of Ozarkian distribution in Missouri. The writer has recently collected it in a region of St. Peter sandstone, north of the Missouri river in Lincoln Co. where a number of typical Ozark species occur, reaching their northeastern limit in the state.

Panicum oligosanthes Schultes. Also collected in Lincoln Co. at its northeastern limit in the state.

Leersia lenticularis Michx. Collected in low ground in a cypress swamp in Mississippi Co.; known previously from Jasper, New Madrid, Butler and Dunklin counties.

Aristida dichotoma Michx. Collected on dry sandstone glades of St. Peter sandstone in Lincoln Co. in the region of Ozarkian extensions northeastward.

Aristida adscensionis L. (*A. fasciculata* Torr. in Gray's Man., 7th ed.). Collected on dry rocky (porphyritic trachyte) slopes of a canyon along the Little St. Francois river in Madison Co.; known previously from Jasper and Jackson counties.

Aristida purpurascens Poir. An Ozarkian species in Missouri; collected in Lincoln Co. at its northeastern limit in the state. Found on dry open St. Peter sandstone slopes.

Muhlenbergia cuspidata (Torr.) Rydb. Collected on exposed Roubidoux sandstone ledges above limestone bluffs along Big Piney river, Pulaski Co. in western south-central Missouri; known previously only from western Missouri in Atchison, Holt, Jackson and McDonald counties. Native of the high plains and prairies, this species enters the western limits of the state on prairies and loess mounds; its occurrence in the Ozark region as far east as Pulaski Co. is a noteworthy one.

Sporobolus canovirens Nash. An Ozarkian species in Missouri, it has been collected during 1932 by the writer in Lincoln Co. at its northeastern limit in the state.

Agrostis Elliottiana Schultes. A rare species in Missouri occurring on acid sandy soils and acid glades, and known previously from Christian, Jasper and McDonald counties in the southwestern portion of the state and from Jefferson Co. in the east-central section. The writer obtained it in collections made during the last two years in low sandy ground in Dunklin Co., southeastern Missouri and on high granite glades in Madison Co., also in southeastern Missouri.

Tricuspis stricta (Nutt.) Gray (*Tridens strictus* (Nutt.) Nash; Gray's Man., 7th ed.). Like the preceding, a southern Coastal Plain species, entering the southern limits of the state in Butler, Dunklin, Jasper and Newton counties on open ground and prairies. The writer collected it in 1932 on a sandy prairie in Mississippi Co. in southeastern Missouri.

Cyperus flavescens L. Penetrating the Ozark region in Missouri, the writer obtained this in Washington Co. in 1932.

Scirpus carinatus Gray. A Gulf Coastal Plain species known previously from sandy prairies in southwestern Missouri in Jasper, Newton and McDonald counties. The writer obtained it in the spring of 1931 on sandy open ground in Dunklin Co. in southeastern Missouri, its first record from the eastern portion of the state.

Carex Hitchcockiana Dewey. A rare species in the state, known previously only from St. Louis, Jefferson and Jackson counties. The writer obtained it during the summer of 1932 in Washington Co. on shaded ravine slopes near the top of high limestone bluffs.

Juncus diffusissimus Buckley. A rather rare species in the state, known from the southern counties, Shannon, Ripley, Howell, Jasper, Barton, Vernon and McDonald. The writer obtained it during 1932 in Crawford Co., extending its range farther north in Missouri.

Zygadenus chloranthus Richards. A northern species previously isolated in Missouri at one locality in the southwestern portion of Shannon Co. The writer collected it during the summer of 1932 on limestone bluffs along Sinking Creek in the northern part of the same county. Its occurrence should be looked for in the future in adjoining counties.

Veratrum Woodii Robbins. A rather uncommon species in the state. The writer collected it during the summer of 1932 in Lincoln and Washington counties.

Spiranthes ovalis Lindl. A species of rare occurrence in the state, known previously from Jackson and St. Louis counties. The writer and J. H. Kellogg collected it flowering during October, 1932, in low dry ground of a desiccated cypress swamp in Mississippi county.

Talinum calycinum Engelm. Known previously in eastern Missouri south of the Missouri river in which region it occurs on exposed acid or leached limestone rocks. The writer collected it during the summer of 1932 north of the Missouri river in Lincoln Co. on exposed St. Peter sandstone glades, extending its known northeastern limits in the state.

Silene gallica L. Known previously only from Jackson Co. The writer and J. H. Kellogg obtained it in 1932 in an old fallow field in Cape Girardeau Co. in southeastern Missouri.

Clematis versicolor Small. A species hitherto collected in Missouri in the more southwestern counties, Barry, McDonald, Ozark, Greene, and Taney. The writer obtained it on wooded limestone ledges in Oregon Co. in southeastern Missouri.

Caulophyllum thalictroides (L.) Michx. A rare species in the state. The writer collected it during the summer of 1932 from two counties from which it had hitherto been unknown, namely, Shannon and Camden.

Thlaspi perfoliatum L. An adventive from Europe, this species has rarely been collected in the United States, and in the last editions of Gray's Manual and Britton and Brown is, of course, not shown as

occurring in Missouri. It has been found in Jefferson Co. in east-central Missouri by Mr. Arthur Christ, and re-collected by the writer and J. H. Kellogg.

Arabis lyrata L. One of the rarest of species in Missouri. It has been known hitherto in the state from two isolated localities, one on limestone ledges in St. Louis Co. and the other on bluffs of St. Peter sandstone in Jefferson Co. The writer during 1931–32 has collected it from two additional counties, on limestone bluffs in Washington and Shannon counties. Its present known range in the state, therefore, is confined to four counties in eastern Missouri.

Sullivantia renifolia Rosendahl. The writer[1] reported on the first occurrence of this species in Missouri in 1931. Later that season the writer again discovered a colony of it persisting on shaded St. Peter sandstone bluffs in Warren Co. in east-central Missouri.

Saxifraga pensylvanica L. var. Forbesii (Vasey) Engl. & Irmsch. In Missouri this variety of the eastern and northern *S. pensylvanica*, is of very limited occurrence and has only been found in regions of St. Peter sandstone in east-central Missouri. Until the writer made in 1931 collections of it from St. Charles, Lincoln, Warren, and Montgomery counties it had been known only from Jefferson Co.

Heuchera puberula Mack. & Bush and Heuchera parviflora Bartl. Both species are of rare occurrence in the southeastern Missouri Ozarks and occur typically on limestone rocks. Both have the lower surface of the leaves colored, usually lilac or pink-purple. The writer has observed that the flowering periods of the two species differ. *Heuchera puberula* begins to flower in June and continues until early September by which time it is usually finished. *Heuchera parviflora*, however, is a much later plant to blossom, its period of anthesis being from August to October. Whether this difference in time of blooming is a real difference and will hold remains for future observation to decide.

Heuchera arkansana Rydb. Collected by J. H. Kellogg during the summer of 1932 in McDonald Co. in southwestern Missouri. This is its first report for the state.

Hamamelis vernalis Sarg. In Missouri this occurs mostly in the Iron Mountain Region and in the region of the White River and its tributaries. During the summer of 1932 the writer obtained it somewhat north of its previously known range in the state along gravel-bars of Roubidoux Creek in Pulaski Co. in south-central Missouri.

Rosa setigera Michx. var. tomentosa T. & G. f. inermis Best. The spineless form is rather uncommon in the state and has been found in southern Missouri, chiefly, however, in the White River region. In 1931–32 the writer obtained it from two additional counties in the Iron Mountain region, namely, Iron and Reynolds counties.

Sesbania macrocarpa Muhl. Known hitherto from two remote

[1] Bull. Mo. Bot. Gard. **19**: 56–57. 1931.

stations in southern Missouri, i. e. in Barry and Dunklin counties. The writer obtained it in 1932 in Mississippi Co.

Oxytropis plattensis Nutt. Known hitherto from the loess mounds of Atchison Co. The writer obtained it from Holt Co. in 1932, again on the loess hills of northwestern Missouri.

Strophostyles helvola (L.) Britton var. missouriensis (Wats.) Britton. Scattered in southern and central Missouri. Found during the summer of 1932 in alluvial bottoms in St. Charles Co.

Croton Engelmanni Ferg. A southern species originally found in Butler Co. in southeastern Missouri. The writer found it in 1932 in Scott, Stoddard and Mississippi counties. It forms rather dense colonies wherever found, and is spreading in the southeastern counties occurring on sandy open prairies and open fields and cultivated ground.

Tragia urticaefolia Michx. (*T. nepetaefolia* in Gray's Man., 7th ed.). Collected by the writer on exposed Roubidoux sandstone glades along Roubidoux Creek, Pulaski Co. during the summer of 1932. Its discovery here is the first in this section of Missouri, since most of the Missouri stations are in the more western portion of the state.

Euphorbia glyptosperma Engelm. Collected during the summer of 1932 on the loess mounds of Holt Co. in northwestern Missouri; known previously from scattered localities in Atchison, Clay, Jackson, Jefferson and St. Louis counties.

Ilex verticillata (L.) Gray. One of the rarest of shrubs in Missouri this species and its associated variety (var. *padifolia*) have hitherto been known only from Madison and Iron counties in the Iron Mountain region. During the summer of 1932 along the East Fork of Black River in Reynolds Co., also in the similarly granitic Iron Mountain region, the writer found it in local abundance.

Parthenocissus quinquefolia (L.) Planch. var. Saint-Paulii (Koehne & Graebn.) Rehder (*Psedera quinq.* var. *Saint-Paulii* (Koehne & Graebner) Rehder in Gray's Man., 7th ed.). Known previously from southwestern Missouri in Jasper, Newton, McDonald and Stone counties. The writer discovered this variety in abundance in a tract of virgin lowland timber in Mississippi Co., its first report from southeastern Missouri.

Callirhoe Papaver (Cass.) Gray. Collected by the writer in low ground in Pulaski Co. and known previously from Pettis, Jackson and Barry counties.

Hypericum mutilum L. Its distribution in the Ozark region of southern and central Missouri has been extended somewhat northeastward by its discovery by the writer during the summer of 1932 in a ravine of St. Peter sandstone in Lincoln Co. north of the Missouri river.

Hypericum gentianoides (L.) BSP. Another Ozarkian species in Missouri which the writer obtained at its present known northeastern limit in the state in the St. Peter sandstone region in Lincoln Co.

Hypericum Drummondii (Grev. & Hook.) T. & G. Found during 1931–32 by the writer at its northeastern limit in Missouri in the St. Peter sandstone region in Lincoln Co.

Hypericum petiolatum Walt. Collected in 1932 by the writer in company with J. H. Kellogg on a fallen log in a swamp in Mississippi Co.; known previously from Butler, Dunklin, New Madrid and Ste. Genevieve counties in southeastern Missouri.

Tamarix gallica L. Mr. Bush collected this species during the summer of 1932 apparently naturalized and thriving on the sandbars of the Missouri River in Jackson Co.

Lechea villosa Ell. Occurring in Missouri on acid soils in the Ozark region. The writer obtained this species during the summer of 1932 at its present known northeastern limit on sandstone glades in Lincoln Co.

Viola pallens (Banks) Brainerd. The writer collected this species in 1931 on moist shaded La Motte sandstone bluffs in Ste. Genevieve Co. This is the first record of the occurrence of this northern species in the state.

Viola lanceolata L. This is another species of violet hitherto unrecorded for the state. The writer collected it in the autumn of 1932 in Mississippi Co., occurring in abundance along a small rivulet in a sandy prairie near Charleston. The leaves at this time of the year were elongated to a maximum of three decimeters, and exceeded by three or four times the fruiting peduncles.

Dirca palustris L. Scattered in southern and central Missouri and an uncommon shrub in the state. The writer collected it in 1931–32 from three additional counties, namely, Washington, Reynolds and Warren counties. It occurs both along protected or shaded portions of high bluffs and in low ground along stream courses.

Ligusticum canadense (L.) Britton. An Alleghanian species which is of rare occurrence in the southern Ozark region. The writer obtained it during the summer of 1932 in Oregon Co.; it has been known previously from Douglas, Iron, Shannon, Wright and McDonald counties.

Angelica villosa (Walt.) BSP. A species known in Missouri in the southern Ozark region. The writer obtained it somewhat north of its previously recorded range in the state in Pulaski Co.

Cornus femina Mill. (*C. stricta* in Gray's Man., 7th ed.). A southern species occurring in the southeastern Missouri counties, it is found penetrating somewhat locally into the Iron Mountain-Ozark region. The writer found it during the summer of 1932 along the East Fork of Black River in Reynolds Co. in the southeastern Iron Mountain region, a county in which it had not previously been collected.

Vaccinium arboreum Marsh. var. glaucescens (Greene) Sarg. A southern Appalachian type occurring in the Ozark region of southern Missouri. The writer collected it in the northeastern extension of the Ozark region in Lincoln Co. at its northeasternmost limit in the

state. At this locality it is very abundant on the St. Peter sandstone glades. The writer also collected it on Roubidoux sandstone glades along Roubidoux Creek in Pulaski Co.

Lysimachia Nummularia L. Collected in 1932 in low shaded ground along the Big St. Francois River in Madison Co.

Fraxinus quadrangulata Michx. The usual habitat in Missouri for this species is rocky bluffs, glades or uplands. Along the Jack's Fork of the Current River in Shannon Co. the writer found this species occurring commonly in low ground in the valley along the stream.

Polypremum procumbens L. Known previously from Clark and Dunklin counties in eastern Missouri. The writer has obtained it during the autumn of 1932 on a sandy prairie in Mississippi Co.

Gentiana quinquefolia L. The writer collected this species, which is rare in the state, in Shannon Co. from which county it had not been previously reported.

Acerates viridiflora Ell. var. linearis Gray. Collected during the summer of 1932 on the loess mounds of Holt Co. where it had hitherto been unreported. This variety is of rare occurrence in the state and has been collected from only three other counties.

Ipomoea coccinea L. Collected by the writer during the summer of 1932 in Reynolds Co., this species is only sporadically adventive in the state.

Scutellaria versicolor Nutt. var. minor Chapm. Collected by the writer during the summer of 1932 on exposed Roubidoux sandstone ledges along Big Piney River in Pulaski Co. This variety has been collected in only a few places in the state.

Scutellaria nervosa Pursh. A rare species of east-central and southeastern Missouri the writer collected it during the summer of 1932 in Cape Girardeau Co. on alluvial soil.

Mecardonia acuminata (Walt.) Small (*Bacopa acuminata* (Walt.) Robinson; Gray's Man., 7th ed.). During the autumn of 1932 the writer collected this species along a small rivulet on a sandy prairie in Mississippi Co. It has been known previously from Dunklin, Jasper and Newton counties.

Aureolaria flava var. macrantha Pennell. The writer collected this species on rocky slopes and upland glades during the summer of 1932 in Oregon and Iron counties. It has previously been collected in Scott, Madison, Wayne, Reynolds and Phelps counties.

Utricularia biflora Lam. A rare species in Missouri which the writer obtained in 1932 in a slough in St. Charles Co. It was flowering abundantly.

Valerianella longiflora (T. & G.) Walp. Collected by the writer in the spring of 1931 on granite glades in Madison Co., southeastern Missouri. This is its first record from any portion of eastern Missouri, since it had previously been collected only in the southwestern portion of the state in Taney, Stone, Barry and McDonald counties.

Cayaponia grandifolia (T. & G.) Small. A very rare southern

species of the lower Mississippi valley, collected for the first time in Missouri by the writer in low swampy woods in Mississippi Co., southeastern Missouri.

Vernonia Baldwini × crinita. During the summer of 1932 the writer collected this in Washington, Jefferson, Oregon and Reynolds counties where it occurred rather commonly. In early summer in Missouri *V. Baldwini* and *V. crinita* are the chief and usually only species of Vernonia in flower, and at this time the hybrid is rather commonly encountered.

Eupatorium sessilifolium L. An Ozarkian species collected during the summer of 1932 in Pulaski, Camden, Crawford and Reynolds counties, from which counties this species had not previously been recorded.

Eupatorium urticaefolium Reichard var. villicaule Fernald. Of rather uncommon occurrence in Missouri where it favors the protection of shaded bluffs. The writer collected this variety during the summer of 1932 in Oregon Co.

Mikania scandens (L.) Willd. Collected in low cypress woods in Mississippi Co. in southeastern Missouri during the autumn of 1932.

Brickellia grandiflora (Hook.) Nutt. Collected during the summer of 1932 by the writer on dry rocky limestone slopes in Pulaski Co. along the Big Piney River. This is a new county record for this species in Missouri which hitherto has been known in the state from Shannon, Reynolds, Ozark, Taney, Barry, Miller and St. Louis counties.

Liatris squarrosa Willd. Reaching its present known northeastern limit in the state in Lincoln Co. where the writer found it on exposed St. Peter sandstone ledges during the summer of 1932. In Missouri this species is typically Ozarkian.

Grindelia lanceolata Nutt. Found by the writer in St. Louis Co. where introduced along railroad tracks. In this place the few plants existing are perennial, due to cutting-over of the vegetation during the summer.

Chrysopsis Berlandieri Greene. Collected by J. H. Kellogg in 1931 in an old cemetery on a loess mound in Holt Co. This is the first collection of this species in Missouri where it has been probably introduced from the prairie region to the west.

Solidago caesia L. Collected by the writer in 1932 on St. Peter sandstone ledges in Cape Girardeau Co., southeastern Missouri.

Solidago rugosa Mill. var. aspera (Ait.) Fernald. Found by the writer in company with J. H. Kellogg during the summer of 1932 in the St. Peter sandstone region in Lincoln Co. at the northeastern limit of its range in Missouri. It has previously been collected from Shannon, Wayne, Iron, Dunklin and Butler counties in southeastern Missouri.

Solidago Gattingeri Chapm. A rare species wherever found, and confined to limestone glades. The writer obtained this from Camden Co. during the summer of 1932 on limestone glades. It had hitherto been found in seven other counties.

Aster salicifolius Ait. var. subasper (Lindl.) Gray. Known previously (from record) from Boone Co. only. The writer collected it on a sandy prairie in Mississippi Co. in southeastern Mo. during 1932.

Aster ptarmicoides T. &. G. Known previously from seven counties. The writer during 1932 collected it from additional counties, namely, Pulaski, Crawford, Washington, and Iron counties on open glades usually above limestone bluffs.

Gnaphalium obtusifolium L. var. micradenium Weatherby. In 1930 the writer collected this glandular-puberulent variety in upland *Pinus echinata* woods on La Motte sandstone soil in Ste. Genevieve Co. Again in 1932 he collected it from upland chert woods in Shannon Co., both localities being in southeastern Missouri. This is the first record of the occurrence of this variety in this state.

Silphium Asteriscus L. A rare species in Missouri, occurring in the southern portion. The writer obtained it during the summer of 1932 in Oregon Co.

Berlandiera texana DC. Collected by the writer during 1932 in Oregon Co. in southeastern Missouri. This species is much commoner in the western than in the eastern Ozark region.

Helianthus divaricatus L. Occurring in the eastern portion of the state where the writer obtained it in Bollinger Co. from which it had not hitherto been reported.

Helianthus angustifolius L. Known previously from one locality in Butler Co., southeastern Missouri. The writer in company with J. H. Kellogg found it abundant during the autumn of 1932 on sandy prairies of Scott and Mississippi counties.

Bidens discoidea (T. & G.) Britton. Found by the writer during the autumn of 1932 along a drainage canal in Cape Girardeau Co. This rare species had been known in Missouri hitherto only from St. Louis and Butler counties.

Lactuca saligna L. Collected by J. H. Kellogg during the summer of 1932 along roadsides in Greene Co. This is the first record of the occurrence of this species in Missouri. Of European origin, this species does not seem to have been collected very often in this country. It was not designated as occurring in Missouri either in the last edition of Gray's Manual or that of Britton and Brown.

Prenanthes altissima L. var. cinnamonea Fernald. Uncommon in Missouri and rarely collected. The writer found it on St. Peter sandstone bluffs in Jefferson Co. during the autumn of 1932 from which county it had not hitherto been reported.

Missouri Botanical Garden.

Notes on Triglochin palustris and Montia lamprosperma in Maine.—In June, 1931, I had occasion to land on Green Island, about a mile SSE. from Petit Manan Point (Steuben township) in Washington County, Maine. This little island consists of a granitic

ledge, with an ox-bow-like sea-wall of coarse blocks of granite and cobbles thrown up around its eastern, northern and western sides, with an opening to the southward, thus forming a shallow cove, open southerly and protected from the more violent storms by the near Island of Petit Manan. In the basin formed by the sea-wall's grit and jetsam driven in by southerly winds, and aided by the growth of beach plants, a salt marsh in an advanced stage of development has been built up. *Spartina patens*, *Juncus Gerardi* and other common associates have formed a tough turf in places. In this marsh I found many plants of the local and uncommon *Triglochin palustris*.

June 25, 1931, I spent several hours on Machias Seal Island, Maine, twelve miles at sea, southerly from Cutler or Little River Harbor. This island, noted for its colonies of sea birds, is quite close to the international boundary between the United States and the Dominion of Canada. Some misunderstanding has appeared concerning the political status of this small island. By provisions of the Ashburton treaty, the island was ceded to the United States (Maine), but, the Dominion having at the time lights and fog signals there, a clause provided that said Dominion should have use of the island for those purposes so long as the towers stand. Needless to say the towers and other buildings are kept in an excellent state of repair.

The island is said to have an area of about thirty-five acres; it is low, and seated upon a broad shallow submarine base, so that all towering seas break before reaching the shore: though the sea walls are heavily pounded during gales, the surges never wash over the upland, as they do at the equally exposed Matinicus Rock, which has steep and deeply submerging shores.

Easterly from the light houses there is an ample marsh, sufficiently wet to provide water for the cow, except at times of extreme drought. In this marsh *Montia lamprosperma* was found in much abundance, growing in dense little mats over a considerable area. There was also a station for the same plant in a rill, in crevices of the ledges, westerly from the light houses. These dense cushion-like mats were decidedly attractive in appearance.

Two days later we made a landing on Flat Island, southeasterly from Jonesport. Here was another marsh very similar in character to that at Seal Island, and here also was another quantity of *Montia lamprosperma*, growing in the soggy marsh at a considerable distance from the shore.—Arthur H. Norton, Museum of Natural History, Portland, Maine.

A Second Station for Isthmoplea in North America.—In Rhodora, Vol. I., p. 126, July, 1899, Frank S. Collins lists *Isthmoplea sphaerophora* (Harv.) Kjellm., which is occasional in the Arctic Ocean and along the European coast as far southward as the western Mediterranean, as very rare in the waters of North America. The only known station was a spot of barely five square meters, at Nahant, discovered by Collins about 1880. This has been the one record for over fifty years. But I wish to record that I collected several specimens at North Brooklin, Maine on May 29th, 1933. They were attached to dead *Sertularia*, borne on *Ascophyllum* which was floating in Blue Hill Bay.—R. E. Schuh, Brooklin, Maine.

The New York Record of Fraxinus profunda.—In the 7th edition of Gray's Manual the southern *Fraxinus profunda* Bush, of swamps and low woods from northwestern Florida to Louisiana, northward to southern Indiana, southern Illinois, southeastern Missouri and eastern Arkansas, was entered from "w. N. Y." This entry arose through a specimen in the Gray Herbarium, "W. N. York, *Sartwell*, ex J. Carey" which the late Professor Sargent had shifted from the cover of *F. pennsylvanica* into that of *F. profunda;* and in his Manual of the Trees of North America, ed. 2: 845 (1922) Sargent cited the Sartwell specimen under *F. profunda* from "western New York (*H. F.* [*P.*] *Sartwell*)." House and other later students of the flora of New York have found no further evidence of the tree in the state; and recently, my attention being called to the matter, I have examined the Sartwell specimen. It has 7 leaflets rusty-pubescent beneath, the longer leaflets very prolonged (to 14 cm.) and mature fruits mostly 4.5 cm. long, in these characters suggesting *F. profunda*, which has the longer mature leaflets 1–1.9 dm. long, the mature fruits 4.5–6 cm. long. *F. profunda,* however, has a very distinct calyx, forming an irregular cup 3–5 mm. deep; the Sartwell sheet having the much smaller calyx, with lobes about 1 mm. long, of *F. pennsylvanica.* Although near the upper limit of length of leaflets and fruit for the latter species, the Sartwell material so definitely lacks the very distinctive calyx of *F. profunda* ("This magnificent tree . . . surpasses the other American species . . . in the size of the calyx of the pistillate flower."—*Sargent,* Sylva, xiv. 36) and is so readily matched by the largest specimens of *F. pennsylvanica*, that the record of *F. profunda* from western New York should be treated as due to a misidentification.—M. L. Fernald.

Another Massachusetts Station for Calluna vulgaris.—As a matter of record I report the discovery on July 13, 1932, of a well established patch of *Calluna vulgaris* (L.) Hull on the links of the Essex County Club, Manchester, Massachusetts. It occurs as a dense mat in low mowed ground on the edge of one of the fairways. Numerous small clumps are scattered in the grass on the periphery of a mat of several square meters in extent. Many of the prostrate branches were in full flower.—Richard J. Eaton, Cambridge.

Glyceria arkansana in western New York.—In 1929 I described, from swamps in Arkansas and Louisiana, a very coarse plant, *Glyceria arkansana*, Rhodora, xxxi. 49, with flaccid leaves 1–2 cm. broad and with large panicles of very delicate spikelets, differing from those of *G. septentrionalis* Hitchc. in having thin glumes, the upper only 2.5–3.5 (in *G. septentrionalis* 4.5–5.7) mm. long, and thin or membranaceous, very sharply keeled lemmas only 2.5–3 mm. long (the coriaceous and obscurely nerved lemmas of *G. septentrionalis* 3.6–5.5 mm. long). Professor A. S. Hitchcock has recently sent me for examination a sheet of *G. arkansana* reputed to come from western New York. Since this extension of range needs confirmation my letter to Professor Hitchcock is here repeated, as directing attention to the desirability of searching for *G. arkansana* in Sartwell's region (Penn Yan):

Dear Professor Hitchcock:

The grass you send, and which I am returning today, is certainly *Glyceria arkansana*, but I cannot help wondering if Charles Mohr (through whom it came) did not make some confusion of specimen and label.

The printed label, no. 48, at the left-hand corner is the label of Asa Gray's North American *Gramineae and Cyperaceae* (1834). We have two sets of the latter, one in the original book-form, the other on sheets in the herbarium, and in both cases no. 48 is perfectly characteristic *G. septentrionalis*. The interpretation by Mohr on the label on the right, that the collector was Knieskern, 1880, does not well fit the fact that the little printed label, no. 48, belonged in a set distributed in 1834. Incidentally, Knieskern died in 1871.

We have in the Gray Herbarium, I find, a second sheet, which had remained unidentified, of good *G. arkansana* from western New York. This is pressed in much the same way as the specimen on the sheet from Mohr's Herbarium and was marked by Asa Gray "*Gl. fluitans*, w. N. Y. Sartwell." It is not impossible that Gray, having scant material of his own collection of *G. septentrionalis*, filled out some sets by putting in specimens of the other plant, *G. arkansana*, collected by Sartwell. The next thing, of course, is for some one to find *G. arkansana* actually growing in Sartwell's region.—M. L. Fernald.

Volume 35, no. 415, including pages 227–262 and 6 plates, was issued 3 July, 1933.

Epilobium Pylaieanum: figs. 1, 2 and 3, fruiting and flowering plants, × 1, from Burgeo, Newfoundland; fig. 4, flower, showing oblong, obtuse calyx-lobes, × 6, from Burgeo; fig. 5, seed, showing slender beak, × 10, from the type, Port aux Basques, Newfoundland.

Vaccinium nubigenum: fig. 1, flowering branch, × 1, from Newfoundland; fig. 2, margin of leaf, × 4; fig. 3, flower, × 4; fig. 4, anthers, × 8.
V. cespitosum: fig. 5, anthers, × 8, from Newfoundland.
V. ovalifolium: fig. 6, anthers, × 8, from Oregon.

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB

Conducted and published for the Club, by

MERRITT LYNDON FERNALD, Editor-in-Chief

JAMES FRANKLIN COLLINS
CHARLES ALFRED WEATHERBY } Associate Editors
LUDLOW GRISCOM

Vol. 35. September, 1933. No. 417.

CONTENTS:

Quercus macrocarpa var. depressa (Nutt.) Engelm. *B. Shimek* . . . 295

Recent Discoveries in the Newfoundland Flora (continued). *M. L. Fernald* . . . 298

Dumontia in Maine. *R. E. Schuh* . . . 315

Some Forms of Grasses. *M. L. Fernald* . . . 316

New Species of Glyceria from the Great Smoky Mountains. *W. A. Anderson* . . . 320

Third Station for Waldsteinia fragarioides in Maine. *A. H. Norton* . . . 322

The New England Botanical Club, Inc.

8 and 10 West King St., Lancaster, Pa.

Room 1001, 53 State St., Boston, Mass.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price, $2.00 per year, net, postpaid, in funds payable at par in United States currency in Boston; single copies (if available) 20 cents. Volumes 1–8 or some single numbers from them can be supplied only at advanced prices which will be furnished on application. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be considered for publication to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than two pages of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

M. L. FERNALD, 14 Hawthorn Street, Cambridge, Mass.

Subscriptions (making *all remittances* payable to RHODORA) to

Ludlow Griscom, 8 W. King St., Lancaster, Pa., or Museum of Comparative Zoology, Cambridge, Mass.

Entered at Lancaster, Pa. Post Office as Second Class Mail Matter.

INTELLIGENCER PRINTING COMPANY

Specialists in Scientific and Technical Publications

EIGHT WEST KING ST., LANCASTER, PA.

CARD-INDEX OF NEW GENERA, SPECIES AND VARIETIES OF AMERICAN PLANTS, 1885 TO DATE.

For American taxonomists and all students of American plants the most important supplement to the Index Kewensis, this catalogue in several ways exceeds the latter work in detail, since it lists not only the flowering plants, but ferns and other vascular cryptogams, and includes not merely genera and species, but likewise subspecies, varieties and forms. A work of reference invaluable for larger herbaria, leading libraries, academies of sciences, and other centers of botanical activity. Issued quarterly, at $22.50 per 1000 cards.

GRAY HERBARIUM of Harvard University,
Cambridge, Mass., U. S. A.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. DAY. Leatherette. Pocket size. Invaluable for collector's memoranda and herbarium records. Published and sold by the GRAY HERBARIUM, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

MEMOIRS OF THE GRAY HERBARIUM. A series of illustrated quarto papers issued at irregular intervals, sold separately.

No. III. The Linear-leaved North American Species of Potamogeton, Section Axillares, by M. L. Fernald. 183 pp., 40 plates, 31 maps. 1932. $3.00.

Gray Herbarium of Harvard University, Cambridge, Mass.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3/4 in. 1 year $4.00, 6 months $2.50.

Type of Aster Tradescanti, × ⅔

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 35. September, 1933. No. 417

QUERCUS MACROCARPA VAR. DEPRESSA (NUTT.) ENGELM[1]

B. SHIMEK

IN western Iowa and the adjacent parts of Minnesota, South Dakota and Nebraska a shrubby oak is frequently found at the borders of prairie groves and on upland prairie. This form was evidently formerly abundant even in eastern Iowa, for the notes of the original U. S. land surveys of Johnson County (made chiefly in 1837, before the settlement of the region) contain frequent references to "grub oaks," "scrub oaks," "grub bur oaks" and "bur oak scrubs."

This was the shrub which occupied the borders of the prairie groves in Iowa, excepting in the north-central and northeastern parts of the state, where *Quercus ellipsoidalis* often replaced it.

It was first described by Nuttall (Genera of North American Plants, vol. II, p. 215; 1818) as *Q. obtusiloba β. *depressa.* Later, DeCandolle (Prodromus, vol. XVI, pt. 2, p. 22; 1868) published the variety under the name *Q. stellata γ. depressa, obtusiloba* being a synonym of *stellata.*

Nuttall's description is very brief, merely citing that it is found "fruiting at the height of 12 to 18 inches from the ground, scarcely ever exceeding 3 feet," but the locality and habitat, "on the hills of the Missouri to the confluence of the river Platte," make the designation of this form definite, for there is no other similar oak in that region.

This form was first given its proper place under *Q. macrocarpa* by Engelmann (The Oaks of the United States, Trans. of the Acad. of Sci. of St. Louis, vol. III, no. 3, p. 382; repr. p. 11; 1876) in the statement that "throughout the north-west, north of the Missouri

[1] Published with aid of a grant to RHODORA from the National Academy of Sciences.

river, a low scrubby form is found, which might be designated as var. *depressa*, as it is undoubtedly the *obtusiloba β. depressa*, Nutt. gen. 2, 215, which has smaller leaves and much smaller acorns than the species, but is clearly a form of *macrocarpa*."

Later (1892) MacMillan (The Metaspermae of the Minnesota Valley, p. 192) merely gave Nuttall's name as a synonym of *Q. macrocarpa*, without recognizing the variety.

Neither Gray's nor Britton's Manual, nor Britton and Brown's Illustrated Flora, nor Sargent's Sylva of North America, mention the variety.

In some of the writer's earlier papers this form was reported as *Q. macrocarpa* var. *olivaeformis*, but was first recognized under its correct designation in 1915 (The Plant Geography of the Lake Okoboji Region, Bull. Lab. Nat. Hist., State University of Iowa, vol. VII, no. 2, p. 31).

Trelease (The American Oaks, Memoirs of the National Acad. of Sciences, vol. XX, p. 108, 1924) also recognizes this as a form of *macrocarpa*.

In Dr. Rydberg's posthumous "Flora of the Plains and Prairies" (1932) this form is described as a new species, *Q. mandanensis*. Specific reference is made to this as the same as *Q. obtusiloba β. depressa* Nutt, "not *Q. depressa*,"—the latter evidently *Q. depressa* Humb. & Bonp., described in 1809. He does not connect it in any way with *Q. macrocarpa*, excepting to say that "it probably hybridizes" with that species.

There can be no question that this is a mere form or variety of *Q. macrocarpa*. On the loess and drift hills of western Iowa, where it is still frequent, it usually occupies the tops of the hills in its most extreme form, fruiting specimens often being less than one foot in height, and on the sheltered sides of the hills grades down into forms which at the foot of the hill are true *Q. macrocarpa*, often exceeding 50 feet in height. The plants gradually increase in size downward and there is no line of demarkation between the variety on the upper part of the slope and the typical form at the base.

It should also be noted that *Q. stellata*, to which this was originally referred, does not occur in the region under consideration, being found in Iowa only near the southern border of the state, especially eastward.

Rydberg's effort to distinguish *Q. mandanensis* from *Q. macrocarpa*

in his key to the genus (p. 263) is not successful. He defines the two "species" therein as follows:

Cup 20 mm. wide, conspicuously fringed; acorns subglobular or round-ellipsoidal, 15–20 mm. in diam.; tall tree 10–50 m. high. . . . . *Q. macrocarpa*

Cup 10 mm. wide, slightly fringed, only the innermost scales caudate-attenuate; acorns ovoid, about 10 mm. in diam.; shrub 1–6 m. [in the description this is given as 1–5 m.] high, often with corky branches. . . . . *Q. mandanensis*

The above-named differences are by no means constant. The cup and acorn of var. *depressa* are smaller than those of the larger easterly forms of *Q. macrocarpa,* but they grade insensibly into the forms of the latter which are found in the drier portions of the region. The writer has collected acorns from rather large trees of *Q. macrocarpa* in dry situations which measure as low as 8–10 mm. in diam., while those of var. *depressa* often exceed 12 mm.

Both forms have the cups varying from distinctly fringed to slightly, or even scarcely fringed. Indeed, some of the cups of var. *depressa* which the writer collected in Shelby County have the cup relatively more conspicuously fringed than in any of our forms of *macrocarpa.*

The shape of the acorns is also so variable in both that it forms no distinctive character.

As previously noted, the size of the plant is also of little use as the two forms intergrade perfectly in this respect.

The corky branches also offer no distinction, for they are usually also found on *Q. macrocarpa* in drier situations.

In the descriptions of the two forms (pp. 264–5) it is further stated that the fruit of *Q. macrocarpa* is short-peduncled, while that of *Q. mandanensis* is subsessile or sessile. This character is also variable in both, and constitutes no specific criterion.

It is therefore evident that *Q. mandanensis* is not worthy of specific rank. It is even doubtful that it should be accorded varietal rank, since the transition is so complete. As in so many of our modern "species," the few extreme, or "typical" specimens in the herbaria may appear to be quite distinct, but the distinction fails in the field when large series are examined.

There is one reason, however, for preserving the varietal name. It is very convenient in ecological discussions, for the variety is invariably found in dry, exposed situations and it is convenient to designate the form by a name. The name of this variety should be then, *Q. macrocarpa* var. *depressa* (Nutt.) Engelm,

Department of Botany, State University of Iowa.

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. Fernald

(*Continued from page 283*)

Euphrasia. Since the revision of *The Genus Euphrasia in North America,* Rhodora, xvii. 181–201 (1915)—Contrib. Gray Herb. no. xliv.—by Fernald & Wiegand, much material has been collected in Newfoundland and eastern Canada and a few collections have been made in Labrador. In so far as the recent collections amplify our understanding of the species and their ranges they are here recorded, following the sequence of the paper above referred to.

*Euphrasia Oakesii Wettst. In addition to the alpine stations already recorded the following should be listed. Newfoundland: turfy barrens and slopes, Sacred Island, Straits of Belle Isle, *Wiegand, Gilbert & Hotchkiss,* no. 28,981. Quebec: in a single dryish turfy pocket, at 915–1100 m., southwestern slope of Mt. Fortin, Matane Co., *Fernald & Pease,* no. 25,269; mossy spots on calcareous sea-cliffs and rock-slides by Gulf of St. Lawrence, slightly west of Marten River, Gaspé Co., *Fernald & Pease,* no. 25,275.

The Quebec material is too young for positive identification but its foliage and pubescence are quite like those of typical *Euphrasia Oakesii.* The Mt. Fortin material comes from a turfy alpine habitat; the material from near Marten River, although from near sea-level, was associated with *Luzula spicata* (L.) DC., *Draba nivalis* Lilj., *Saxifraga cernua* L., *Potentilla nivea* L., *Androsace septentrionalis* L. and other arctic-alpine species. Most of the material from the Shickshock Mts., of Matane County, originally distributed as *E. Oakesii,* proves upon restudy to belong with *E. Williamsii.*

*E. Williamsii Robinson. Straits of Belle Isle, Newfoundland: turfy hillsides and barrens, western side of Quirpon Island, *Wiegand, Gilbert & Hotchkiss,* no. 28,973; in carpet of *Salix Uva-ursi* Pursh, open peaty and gravelly spots on crests of trap cliffs, Cape Onion, *Fernald & Long,* no. 28,974; dry gravelly and turfy limestone barrens, Savage Point, *Fernald & Long,* no. 28,976. Matane Co., Quebec (all distributed as *E. Oakesii*): wet calcareous cliffs and ledges, Nettle Gully, alt. about 400 m., northern base of Mt. Collins, *Fernald, Griscom, Mackenzie, Pease & Smith,* no. 26,001; talus of mica schist, chimney east of Razorback Ridge (alt. 850–1000 m.), Mt. Logan, *Pease & Smith,* no. 26,002; dry talus and ledges of green schists, at about 900–1125 m. alt., Hanging Valley, Mt. Pembroke, *Griscom & Pease,* no. 26,003; gravelly and turfy slides and chimneys at about 850–1000 m. alt., in the steep schistose southern face of Mt. Fortin, *Fernald &*

Smith, no. 26,004; shelves of cliffs and upper talus of green schists, alt. about 1100–1150 m., head of Hanging Valley, Mt. Pembroke, *Fernald & Smith*, no. 26,005.

E. WILLIAMSII, var. VESTITA Fern. & Wieg. Including *E. Oakesii*, forma *lilacina* Fern. & Wieg. Northern and western Newfoundland and adjacent Quebec Labrador; additional records follow. NEWFOUNDLAND: crests of dry trap cliffs and turfy headlands, Sacred Island, Straits of Belle Isle, *Wiegand, Gilbert & Hotchkiss*, nos. 28,975, 28,987; dry limestone gravel, Dog Peninsula, St. Margaret Bay, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 28,989; turfy limestone crest, alt. 650 m., Killdevil, Bonne Bay, *Fernald, Long & Fogg*, no. 1999; dry upper diorite slopes and rock-crests at about 675–750 m. alt., Lookout Mt., Bonne Bay (type region), *Fernald, Long & Fogg*, nos. 1996, 1997; trap ledges and gravel, subalpine southern slope of Lark Mt., Bay of Islands, *Fernald, Long & Fogg*, no. 400. QUEBEC: calcareous sandstone cliffs of the upper terrace, Blanc Sablon (type region of *E. Oakesii*, forma *lilacina*), *Fernald, Wiegand & Long*, no. 2896. See pp. 6, 88.

Additional experience indicates that *Euphrasia Williamsii* var. *vestita* and *E. Oakesii*, forma *lilacina* are inseparable. The plant stands midway between typical *E. Williamsii* (with chocolate-brown to maroon corollas and glabrous leaves) and typical *E. Oakesii* (with the corolla white, with violet veins, and the leaves pilose-hirtellous). In var. *vestita* the color of the corolla varies ("purple, not chocolate" in no. 28,987; "crimson" in the type; "chocolate-brown to maroon" in no. 28,989; "chocolate-purple" in no. 400; "lilac" in type of *E. Oakesii* var. *vestita*). It may eventually seem wiser to treat the group as one species, *E. Oakesii*, with localized varieties differing in color of corolla and in pubescence, parallel with the variations of *E. purpurea*.

E. PURPUREA Reeks. Additional localities in NEWFOUNDLAND: turfy sandstone ledges, White Point, Bonne Bay, *Fernald, Long & Fogg*, no. 1990; brackish spot and gravelly beach, East Arm, Bonne Bay, *Fernald, Long & Fogg*, nos. 2,000, 2,001; knolls in sphagnous marsh, Lark Harbor, Bay of Islands, *Fernald, Long & Fogg*, no. 402; turfy and gravelly talus of sandstone sea-cliffs, Woody Island, Bay of Islands, *Fernald, Long & Fogg*, nos. 403, 404 (very succulent); wet mossy barrens back of Port aux Basques, *Fernald, Long & Dunbar*, no. 27,043; sandy loam back of barrier-beach, Great Barachois (or Barasway Bay), Burgeo and La Poile, *Fernald, Long & Fogg*, no. 406.

*E. PURPUREA, forma CANDIDA Fern. & Wieg. Described from Magdalen Islands and from Saguenay Co., Quebec; clearly a white-flowered form of the glabrous *E. purpurea*. Now known from the Straits of Belle Isle, NEWFOUNDLAND: turfy upper border of limestone strand, Cape Norman, *Wiegand & Long*, no. 29,001; open peaty and

gravelly spots on crests of trap cliffs, Cape Onion, *Fernald & Long*, no. 28,977 (minutest of plants, fully mature and branching flowering specimens with leafy summit often only 3 mm. in diameter).

*E. PURPUREA, var. RANDII (Robinson) Fern. & Wieg. Typical var. *Randii*, with corollas purple and the faces of the green leaves sparsely crisp-pubescent, proves to be frequent on the coast of Newfoundland and to extend farther north on the Labrador than we knew in 1915. The new northern records follow. LABRADOR: fresh marsh, upland terrace, Indian Harbor, lat. 54° 25′, *Harlow Bishop*, no. 530. NEWFOUNDLAND: turfy and shingly limestone shore, Capstan Point, Flower Cove, *Fernald, Long & Dunbar*, no. 27,063, *Fernald & Wiegand*, no. 29,013; turfy knolls near the hospital, Flower Cove, *Fernald*, no. 29,015; basaltic talus near mouth of Wallace's Brook (so. of Bonne Bay), *Fernald, Long & Fogg*, no. 1993; shelves and talus of diorite cliffs, Western Head, Bonne Bay, *Fernald, Long & Fogg*, no. 1994; turfy crests of trap headlands, Lark Harbor, *Fernald, Long & Fogg*, no. 401; bare spots on peaty and gravelly slopes and peaty and gravelly thickets, French (or Tweed) Island, Bay of Islands, *Fernald, Long & Fogg*, nos. 407 (dense form in open habitat), 408 (lax shaded form); dry peaty barrens among the gneiss hills back of Port aux Basques, *Fernald, Long & Dunbar*, nos. 27,048, 27,049; in turf on granite ledge, Gaultois, *Fernald, Long & Dunbar*, no. 27,045; granitic ledges, Ramea, *Fernald, Long & Dunbar*, no. 27,046; turfy sand plain back of the beach, Sand Bank, west of Burgeo, *Fernald, Long & Fogg*, no. 405; granite ledges and boulders by the sea, Burgeo, *Fernald, Long & Dunbar*, no. 27,047; damp depressions in sand and gravel back of barrier beach, Argentea, *Fernald, Long & Dunbar*, no. 27,044.

E. PURPUREA, var. RANDII, f. ALBIFLORA Fern. & Wieg. Reported from Newfoundland in 1915 only from the East Coast. Now known to be more general around the coast: dry gravel of limestone barrens, southern half of Burnt Cape, Pistolet Bay, *Fernald & Long*, no. 28,996; turfy or peaty pockets in limestone ledges, Sandy (or Poverty) Cove, Straits of Belle Isle, *Fernald, Long & Dunbar*, no. 27,036 (distributed as *E. Oakesii*); turfy and gravelly limestone strand, Yankee Point, Straits of Belle Isle, *Fernald, Wiegand & Long*, no. 28,982; peaty or turfy pockets in limestone barrens, Brig Bay, *Fernald, Long & Dunbar*, no. 27,040 (distributed as *E. Oakesii*); turfy limestone shore and damp peaty hollows in limestone barrens, Sandy Cove, Ingornachoix Bay, *Fernald, Long & Dunbar*, nos. 27,041, 27,042 (distributed as *E. Oakesii*); crests, crevices and talus of trap sea-cliffs, French (or Tweed) Island, Bay of Islands, *Fernald, Long & Fogg*, no. 399; wet bog-barrens, Trepassey, *Fernald, Long & Dunbar*, no. 27,052.

On account of its extreme dwarfing much of the material was originally mistaken for *E. Oakesii*, but even the small plants (unless crowded) have a strong tendency to divergent basal branching, while the smaller-flowered *E. Oakesii* is almost uniformly simple, the

rare branching plants having few ascending branches chiefly from the median axils.

E. PURPUREA, var. FARLOWII (Robinson) Fern. & Wieg. Frequent near the coast; the following NEWFOUNDLAND records may be noted: turfy barren slopes, Sacred Island, *Wiegand, Gilbert & Hotchkiss*, no. 28,980; open peaty and gravelly spots on crests of trap cliffs, Cape Onion, *Fernald & Long*, no. 28,979; turfy and peaty spots (various stations, as *E. Oakesii*), Flower Cove, *Fernald, Long & Dunbar*, nos. 27,034, 27,035, 27,037, 27,038; turfy limestone shore, St. Barbe, *Fernald, Long & Dunbar*, no. 27,039, as *E. Oakesii;* dry limestone gravel, Dog Peninsula, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 28,983; headlands, Green Gardens, Cape St. George, *Mackenzie & Griscom*, no. 11,124; dry peaty barrens among the gneiss hills back of Port aux Basques, *Fernald, Long & Dunbar*, no. 27,054; turfy pastures, Argentea, *Fernald, Long & Dunbar*, no. 27,053; wet bog-barrens, Trepassey, *Fernald, Long & Dunbar*, no. 27,052; peaty pockets in silicious rocks near crest of South Hill, St. John's, *Fernald, Long & Dunbar*, no. 27,051.

*E. PURPUREA, var. FARLOWII, f. IODANTHA Fern. & Wiegand. Originally from Matinicus Island, Maine, now known from several regions in NEWFOUNDLAND: turfy and gravelly limestone strand, Yankee Point, Straits of Belle Isle, *Fernald, Wiegand & Long*, no. 28,985; turfy limestone barren, Capstan Point, Flower Cove, *Fernald*, no. 28,984; turfy limestone barrens, Dog Peninsula, St. Margaret Bay, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 28,988; dry limestone barrens, upper slopes and tablelands, alt. 200–300 m., Table Mt., Port au Port, *Fernald & Wiegand*, nos. 3998 (individuals with glandular bracts), 4002 (bracts glandless); dry peaty crests of gneiss hills near Sand Bank, west of Burgeo, *Fernald, Long & Fogg*, no. 409.

E. DISJUNCTA Fern. & Wieg. The commonest species of Newfoundland with medium-sized whitish corolla, general in the northern, central and western regions, south to Notre Dame Bay, the Exploits Valley and the Cod Roy area.

E. ARCTICA Lange. Recorded from Newfoundland only from Table Mt., Port au Port Bay; common in northern Newfoundland: St. Anthony, September 10, 1923, *A. G. Huntsman;* Quirpon Harbor, September 8, 1923, *Huntsman;* slaty cliffs and talus, Cape Raven, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,000; upper border of limestone gravel-beach and turfy limestone barrens, Burnt Cape, Pistolet Bay, *Fernald & Long*, nos. 28,995, 28,997; turfy limestones barrens, Cape Norman, *Wiegand & Long*, no. 29,002; turfy limestone barrens, Yankee Point, Straits of Belle Isle, *Fernald, Wiegand & Long*, nos. 29,005–29,009; turfy limestone barren, Capstan Point, Flower Cove, *Fernald*, no. 29,004, *Fernald & Wiegand*, no. 29,012; springy cliffs and talus above the Overfall of Deer Pond Brook, Highlands of St. John, *Wiegand, Gilbert & Hotchkiss*, no. 29,017; dryish limestone

talus, western face of Doctor Hill, *Fernald & Long*, no. 29,020; turfy limestone strand, Bard Harbor, St. John Bay, *Wiegand & Gilbert*, no. 29,018 (gigantic, some plants nearly 6 dm. high, with bracts 2 cm. broad); turfy limestone barrens, St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, nos. 28,992, 28,994, 29,026; turfy terraces and slopes on limestone barrens, Pointe Riche, *Fernald, Long & Fogg*, no. 1989.

As *Euphrasia arctica* I am treating the plant so common about the coast of the lower St. Lawrence in Quebec and in northwestern Newfoundland, thence north around the coast of Labrador to Hudson Bay; also on the coast of Greenland, on Iceland and the Faeröe Islands and somewhat general around the subarctic regions. Our plant is well matched by much Greenland material as well as specimens from Iceland and arctic Scandinavia, and it seems to be quite inseparable from the Greenland, Iceland and Faeröes plant so beautifully illustrated, as *E. officinalis*, var. *latifolia*, by Lange in Fl. Dan. xvii. fasc. xlix. 9, t. mmdccccx. (1877); the smaller and less pubescent plants from Labrador and Newfoundland so closely matching Lange's plate that the latter must have been made from very similar material. *E. arctica* was published in a list of plants of the Faeröes by Rostrup as

**E. arctica* Lge (in litt.). Denne forhen ubeskrevne, ret ejendommelige art eller underart er temmelig almindelig, den er også funden i Grønland og Island ifølge meddelelse af prof. Lange. Char.: Folia viscoso-puberula, reniformi- vel cordato-orbicularia, obtusissime crenata, margine revoluta; bracteae majusculae, sensim acutius crenatae v. serratae; flores subcapitato-congesti.[1]

Unfortunately, however, to work back to the beginning of a complicated question, Hooker, not at all understanding the genus *Euphrasia*, had enumerated from "Prairies of the Rocky Mountains," *Drummond*, a *E. officinalis*, "β. var. rotundifolia, laxiflora.—E. latifolia. *Ph. l. c.* (*non* L.)"[2] The Drummond plant, from the Rocky Mts. (*E. officinalis*, β. of Hook.), as shown by a good sheet of it in the Gray Herbarium, is *E. disjuncta* Fern. & Wieg. Whether or not it was like anything Pursh may have seen from Labrador, it is now impossible to say. Pursh gave no new diagnosis and he certainly had no thought of publishing a new species. His publication was very simple and clearly shows that he was merely identifying some plant of Labrador with *E. latifolia* of Willdenow's Species Plantarum.

latifolia. 2. E. foliis ovatis dentato-palmatis, floribus spicatis, corollis tubulosis, laciniis labii inferioris obtusis. *Willd. sp. pl.* 3, *p.* 192.

[1] Rostr. Bot. Tidsskr. iv. 47 (1870).

[2] Hook. Fl. Bor.-Am. ii. 106 (1838).

Icon. *Sabb. hort.* 3. *t.* 7. *Moris. hist.* 3. *s.* 11. *t.* 24. *f.* 8.
In Labrador. *Colmaster.* ⊙. July. *v. s. in Herb. Dickson.*
Flowers smaller, pale purple.[1]

Pursh, as stated, was obviously simply identifying a plant in Dickson's herbarium with the already published *Euphrasia latifolia* L. (and subsequently Willd.), giving word-for-word Willdenow's diagnosis of a plant of southern Europe and northern Africa (which does not belong even to the genus *Euphrasia* as now accepted, but to *Parentucellia*) and citing two plates of the latter.

Only by one comparative phrase, "Flowers smaller, pale purple," thrown in as a comment, did Pursh depart from the literal copying of Willdenow's description of *Euphrasia latifolia* L., i. e. *Parentucellia latifolia* (L.) Caruel. The latter plant has red flowers 1–1.5 cm. long, much larger than in any North American species of true *Euphrasia.* Pursh's comparative comment, if meant to indicate that the Labrador specimen which he saw in Dickson's herbarium had "Flowers smaller" than in *E. latifolia* L. of the Mediterranean region, would, consequently, be quite useless in making out which of the 11 Euphrasias known from the Labrador Peninsula he might have seen. Pursh's comparative comment should be interpreted, however, like parallel cases in his *Flora:* he was comparing the plant which he misidentified with the Mediterranean *E. latifolia* with the species preceding it in his *Flora,* his *E.* "*officinalis* . . . In Canada. *Michaux.* . . . *v. s.* Flowers white, with purple veins." Since the Michaux plant, as shown by his material at Paris which I have examined, is the only *Euphrasia* known in the region of Canada traversed by either Michaux or Pursh, *E. canadensis* Towns., which, as defined by Wiegand and me from full field-knowledge of it, has "corolla 5–6.5 mm. long, white with lavender or bluish veins," it should be clear that Pursh's critical note, that the Labrador plant has "Flowers smaller, pale purple," may have some real significance. Of the 11 Euphrasias known from Labrador 6 (*E. Oakesii, E. Williamsii* var. *vestita, E. purpurea* and vars. *Randii* and *Farlowii,* and *E. disjuncta*) have flowers measurably smaller than in *E. canadensis* (the Canadian "*E. officinalis*" of Pursh's Flora), and of these *E. Williamsii* var. *vestita, E. purpurea* and *E. purpurea* var. *Randii* have the flowers purple, though there may be a lilac tinge on the upper lip of the others. Unfortunately, the plant which Pursh saw in Dickson's herbarium is not now known; though, in view of the facts, that Pursh was merely misidentifying it with a

[1] Pursh, Fl. Am. Sept. ii. 430 (1814).

species of another genus and that the name *E. latifolia*, misapplied by him, had already been preëmpted by Linnaeus, the search for the plant in Dickson's herbarium might seem a needless one. But, still more unfortunately, several European botanists have magnified Pursh's misidentification of a Labrador plant with *small, purple flowers* with a Mediterranean plant of another genus into an assumption that Pursh intended to describe a new species! Consequently, the name *Euphrasia latifolia*, wrongly ascribed to Pursh, has got very extensively into the literature of *Euphrasia* and far-reaching conclusions have been drawn therefrom.

Hooker, having material of the remotely flowered *Euphrasia disjuncta*, with smallish white corollas, from the Canadian Rocky Mts., called it, as already noted, *E. officinalis*, "β. var. rotundifolia, laxiflora.—E. latifolia. *Ph. l. c.* (*non* L.)." Lange, after properly publishing *E. arctica* in 1870, discovered Hooker's identification here quoted and, apparently not taking the trouble to learn the character of Pursh's original publication, abandoned his own well published *E. arctica*, with white corollas 5–8 mm. long, and in the text accompanying his beautiful plate in Flora Danica (t. mmdccccx.) reduced it to varietal rank as *E. officinalis* var. *latifolia* (Pursh). Lange's synonymy there given (in 1877) was as follows: "E. latifolia *Pursh* Fl. Am. sept. 2, p. 430; E. officinalis var. rotundifolia *Hook.* Fl. Amer. bor. 2, p. 106; E. arctica *Lge.* (Bot. Tidskr. I. 4, p. 47)," in explanation of which Lange made the "*Obs.* Ex definitione *Hookerii* l. c. nostra planta respondere E. latifolia *Pursh.*"

As pointed out in a preceding paragraph, Pursh was merely misidentifying some plant of Labrador with *small purple flowers* with the Mediterranean *E. latifolia* L. If it be maintained that by his phrase "Flowers smaller, pale purple" Pursh was defining a new species, it must at least be admitted that the only plants known with small and purple flowers which he could have seen from Labrador are the three already enumerated, *E. Williamsii* var. *vestita* with purple (usually chocolate-purple) corollas only 2.5–4 mm. long, and *E. purpurea* and its var. *Randii*, with deep-purple to pale-roseate corollas also only 2.5–4 mm. long. Pursh certainly was not describing the plant with white corollas 5–8 mm. long, so beautifully illustrated by Lange and supposed by him to be "E. latifolia *Pursh.*" The plant which Hooker had from the Rocky Mountains is the slender species with small and remote white flowers (corollas 4–5.5 mm. long), *E. disjuncta*, and not

conspecific with the plant of Greenland, Iceland and the Faeröes illustrated by Lange. Incidentally the name, *E. officinalis*, var. *rotundifolia* started with Lange; Hooker had given it no name, merely "β. var. rotundifolia, laxiflora," this descriptive phrase not constituting a true *name*. Eliminating from Lange's publication in Flora Danica the citations which do not belong to the species he described and illustrated, we have left the characteristic subarctic species which he had already properly published as *E. arctica*.

Wettstein, misled by the earlier literature, took up *E. latifolia* as of Pursh, with *E. arctica* Lange as a synonym, in his great *Monographie der Gattung Euphrasia* (1896) and, quite naturally, he has been followed by others who have not realized the errors involved. Wettstein, however, himself realized the doubt surrounding the name *E. latifolia* as used by Pursh, but since *E. latifolia* L. (the description of which Pursh had directly copied from Willdenow) is now removed to *Parentucellia*, Wettstein felt that something Labradorean should be attached to the name in Pursh's sense. Unfortunately, however, such slight characterization as can be deduced from Pursh's "Flowers smaller [than in *E. canadensis*, with white corollas smaller than in *E. arctica*], pale purple" leads in the direction of *E. purpurea*, rather than to the large- and white-flowered *E. arctica*. However that may be, the homonym-rule now effectively disposes of *E. latifolia* Pursh in Wettst. Mon. Euphr. 136 (1896), for *E. latifolia* L. (1753) abundantly antedates it.

Mr. H. W. Pugsley[1] feels, I do not understand why, that there is doubt as to what Lange meant by *E. arctica*. Lange's description, published by Rostrup, was clear; in Flora Danica where, following the wholly uncomprehending suggestion of Hooker, Lange revived the indefinite "*E. latifolia* Pursh," he placed his own *E. arctica* unequivocally with it and illustrated in an unexcelled plate the common plant of Greenland, Iceland and the Faeröes, with white corollas 5–8 mm. long. Wettstein, likewise, did not hesitate to treat *E. arctica* as the boreal plant described and illustrated by Lange, though he perpetuated the error of calling it "*E. latifolia* Pursh."

In view of this seeming clarity (clarity most unusual in taxonomic work prior to the very recent insistence upon designating a "type") as to what Lange actually meant by *Euphrasia arctica*, it is quite perplexing to find Pugsley doubting the identity and substituting for

[1] Pugsley, *A Revision of the British Euphrasiae*, Linn. Soc. Journ., Bot. xlviii. 490, 492 (1930).

"*Euphrasia latifolia* Pursh ex Wettstein" the new name *E. frigida*. Pugsley's substitution was made in a foot-note quoted below:

The recent Congress at Cambridge having decided to reject homonyms, the name *E. latifolia* cannot be used. It is therefore proposed, as some doubt attaches to the identity of *E. arctica* Lange, to substitute a fresh name Euphrasia frigida.

Surely, if there is any doubt whatever (which I am unable to discover) regarding the real identity of *Euphrasia arctica* Lange, there is hopeless doubt regarding the exact identity of *E. frigida* Pugsley. Tossed off as an afterthought in a foot-note, as a substitute, without any type designated, for "*E. latifolia* Pursh ex Wettstein," it goes directly back for its typification, first to Wettstein, then to Pursh. As already emphasized, Pursh did not definitely publish a new species; he merely misidentified a plant of Labrador with a Mediterranean plant now put into a different genus. The only comment which can possibly be cited as constituting a new diagnosis by Pursh indicates, if it indicates anything, one of the very small-flowered Labradorean species, perhaps either *E. purpurea* Reeks or *E. Williamsii* Robinson, with purple (not white) corollas rarely 4 mm. long. Wettstein also includes *E. officinalis* "var. *rotundifolia* Hook.," which was based solely on a collection of the white-flowered *E. disjuncta* Fern. & Wieg. His other citations may or may not be conspecific with *E. arctica;* they cannot be at the same time conspecific with that, with *E. disjuncta* and with *E. purpurea* or *E. Williamsii* (one or the other of these two presumably the plant which Pursh had). Although there seems no justification for the new name *E. frigida*, its publication would have added less to the confused ideas already prevailing if its author had taken pains to give it a definite typification; and by refraining from publishing an ill defined name he could have prevented hours of futile plodding through the obscure paths of nomenclature.

E. stricta Host. Already well known from southeastern Newfoundland, now recorded from the West Coast: sandy and gravelly strand west of Bard Harbor, St. John Bay, *Fernald & Long*, no. 29,027; wet open hillside, Neddy Harbor, Bonne Bay, *Harlow Bishop*, no. 532.

E. americana Wettst. The commonest species of southern and central Newfoundland, in dry open soil, extending north to Notre Dame Bay, the Exploits Valley and St. John Bay.

Pugsley, in his *Revision of the British Euphrasiae*, Linn. Soc. Journ., Bot. xlviii. 521 (1930), seems to refer *E. americana* to the European

E. brevipila Burnat & Gremli. At least, at the end of his discussion of *E. brevipila* he says:

> A form apparently inseparable from this species is found in Newfoundland and Canada—possibly an introduction from Europe. This is represented in the exsiccata[e], Macoun, No. 1696 (Cape Breton), Fernald, No. 3989 (Newfoundland) and Fernald, No. 8026 (Magdalen Is., Quebec).

The numbers of my own (and other's) collecting, *i. e. Fernald, Wiegand & Kittredge*, no. 3989 and *Fernald, Long & St. John*, no. 8026, are before me and they are very characteristic *Euphrasia americana*, as usual with the leaves and bracts glabrous; while, as Pugsley correctly states, in the European *E. brevipila* they are "all *clothed . . . with ± shortly stalked glands and short bristles.*" In *E. americana* the flowers are borne only on the upper half of the stem and branches, the first flowers of the central axis appearing (in well developed plants) at the 8th–11th node; and in mature fruiting plants the base of the central inflorescence is about midway on the axis. In the glandular European *E. brevipila*, however, as shown by Wettstein's plate (his t. vii. fig. 8) and by various European specimens (*Braun-Blanquet*, Fl. Raet. Exsicc. no. 676; *Pampanini*, Fl. Ital. Exsicc. no. 339; *Palmér*, Fl. Suec. no. 1079; *Fernald, Pease & Long*, no. 2377, identified by Pugsley; and unnumbered specimens from Fries, Fröman, Asplund and others) the central inflorescence (on the main axis) occupies, when fully developed, three-fourths to five-sixths of the entire central axis; the first flowers of the central axis appearing at the 5th–8th node. In *E. americana* the lower lip is white (only rarely bluish), but with bluish or purple veins; in *E. brevipila* the corolla is usually purplish or bluish ("Corolla pallide violacea vel coerulea"—*Wettstein;* "*Corolla . . . lilac*"—Pugsley). In *E. americana* the mature capsules are distinctly exceeded by the calyx, in *E. brevipila* not exceeded by it ("Capsula . . . calycem aequans vel superans"—*Wettstein;* "Capsule . . . equaling or exceeding the calyx-teeth"—*Pugsley*). Other characters, in the corolla and the calyx, could be pointed out which at once differentiate *E. americana* from *E. brevipila*, but those already indicated are sufficient. I have before me at this writing 141 numbers of *E. americana*, with the collecting of more than 50 of which I have been personally concerned. Like all the annual species it varies in stature (up to 4.4 dm. high), degree of branching and size of foliage and bracts; but in its essential characters it is abundantly distinct from the glandular-pubescent, low-flowering European *E. brevipila* with bluish to lilac corollas and short fruiting calyx.

Orobanche terrae-novae Fern. Rhodora, xxviii. 235 (1927).

Since *Orobanche terrae-novae* was proposed as a species excellent additional characters have been detected in the capsules and seeds. Fruiting material from several stations in Newfoundland, as well as from Anticosti, shows that the capsules are lance-conic, more easily pushing off the marcescent corollas than in the continental *O. uniflora* L., which has the ovoid capsules usually closely invested by the marcescent corollas. In *O. terrae-novae* the seeds (fig. 2) are more elongate,

Fig. 2. Seeds, × 45, of Orobanche terrae-novae.

Fig. 3. Seeds, × 45, of Orobanche uniflora.

with more delicate reticulation than in the continental *O. uniflora* (fig. 3) or in the western *O. Sedi* (Suksd.) Fern. In the latter species they are rounded-ellipsoid and shorter than in *O. uniflora* and even more reticulate. See pp. 48, 95.[1]

*Plantago major L., var. asiatica (L.) Dcne. Bonne Bay: alluvial islands and shores at mouth of Main River, *Fernald, Long & Fogg*, no. 2018; brackish swale near mouth of McKenzie River, no.

[1] Since the paragraph on *Orobanche* went into type, *A revision of the section Gymnocaulis of the genus Orobanche*, by Daisy M. Achey, has appeared—Bull. Torr. Bot. Cl. lx. 441–451 (June, 1933). Miss Achey reduces *O. terrae-novae* to varietal rank as *O. uniflora* L., var. *terrae-novae* (Fern.) Achey, l. c. 444 (1933). She seems not to have specially studied the capsules and seeds (figs. 2 and 3), usually very conservative structures, and she finds support in my statement, in the original discussion, that "*Orobanche terrae-novae* is perhaps merely a geographic variety," quoting the suggestion without the qualifying "perhaps." Fig. 2 shows seeds, × 45, of *O. terrae-novae* from Bard Harbor Hill, *Fernald & Long*, no. 29,053; fig. 3, seeds, × 45, of *O. uniflora* from Johnston, Rhode Island, May 30, 1890, *J. F. Collins*.

2019. See p. 92. Collected by Mrs. Ayre in September, 1932 "miles from anywhere" in the region of Salmonier.

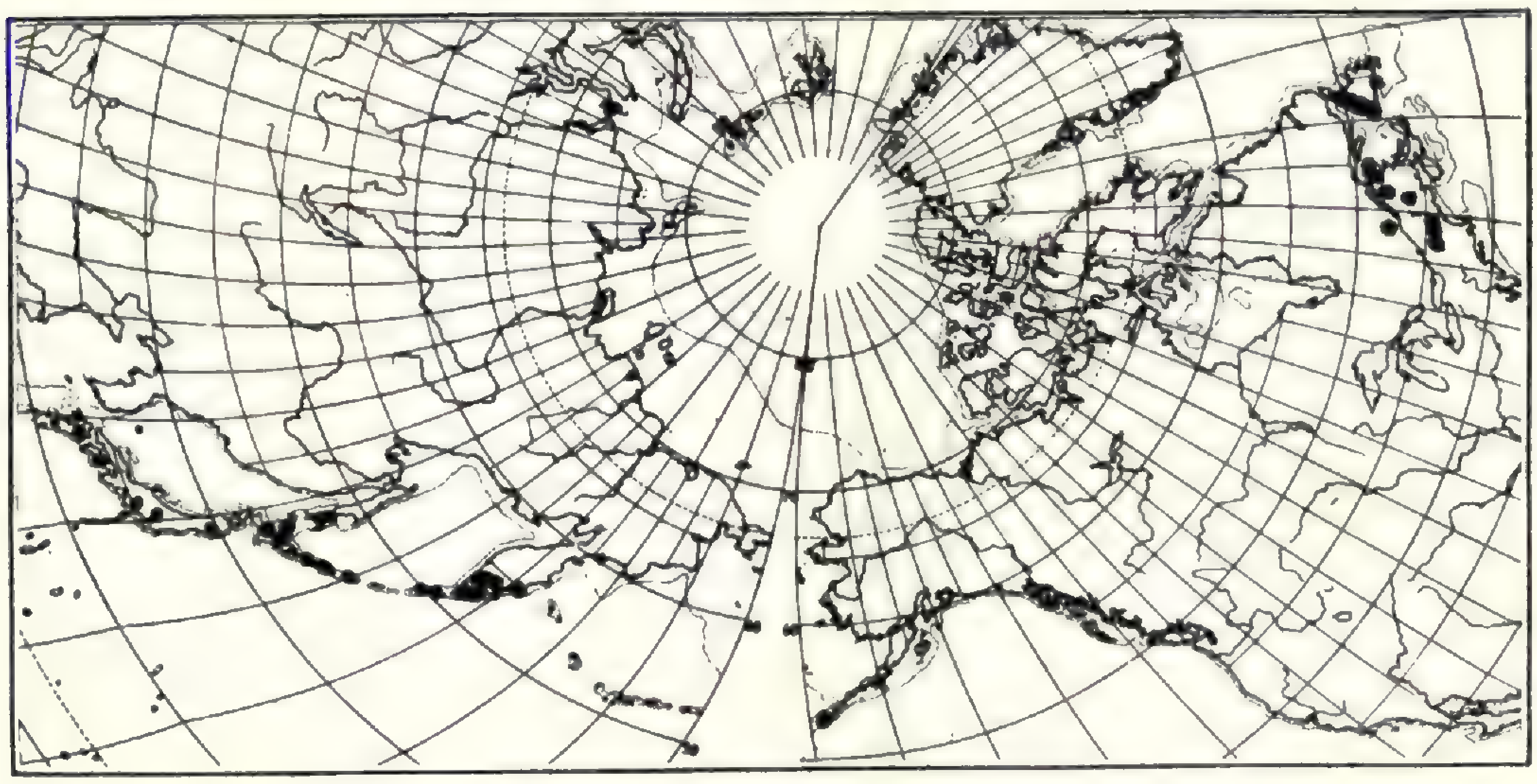
In the present wholly unsatisfactory state of our knowledge of the *Plantago major* group I am leaving the indigenous circumpolar plant as a variety of *P. major.* A thorough study of the group in America is much needed.

*P. LANCEOLATA L., var. SPHAEROSTACHYA Mert. & Koch, f. VERNALIS Béguinot BAY OF ISLANDS: turfy pasture-slope, Curling, *Fernald, Long & Fogg,* no. 2020.

Forma *vernalis,* characterized by short elliptic-ovate, instead of elongate leaves, and by very short, subglobose spikes, seems not to have been recorded in America.

GALIUM KAMTSCHATICUM Steller. To the recorded Newfoundland stations add the following. BONNE BAY: damp thicket under limestone crest (alt. 650 m.), Killdevil, *Fernald, Long & Fogg,* no. 2023. VALLEY OF HARRY'S BROOK: near Force-le-Plain, *R. B. Kennedy,* no. 332.

Galium kamtschaticum is a very notable case of bicentric distribution: northeastern Asia and adjacent Aleutian Islands, and northeastern America (MAP 25). I have tried in vain to separate our eastern



Map 25. Bicentric Range of GALIUM KAMTSCHATICUM.

American plant (*G. Littellii* Oakes; *G. circaezans,* var. *montanum* T. & G.) from the Asiatic but in every important point the two seem the same. *G. kamtschaticum* has been recorded from Washington and Oregon, but the plant of that area has several very evident characters (stiffer texture; 5–9, instead of 2–4, primary whorls of leaves; blades

narrower and with strikingly different venation; flowers more numerous; corolla of thicker texture, with obtuse, instead of acute, lobes; styles elongate, instead of sub-suppressed; etc.). The plant of Washington and Oregon is the thoroughly distinct *G. oreganum* Britton. Since the map was engraved I have learned of the occurrence of *G. kamtschaticum* in Corea.

SAMBUCUS PUBENS Michx. The northernmost station known on the West Coast is on BONNE BAY: base and lower slopes of Gros Morne, *R. H. Kimball*, no. 88.

The broader and more open as well as much larger inflorescences, the usually more oblong-elliptic leaflets well grown at flowering time and the more coarsely rugose seeds seem sufficiently to separate the American *Sambucus pubens* from the European *S. racemosa* L. Typical *S. pubens* has at least the young leaves somewhat pubescent beneath. However, the foliage may be wholly glabrous from the first.[1]

CAMPANULA ROTUNDIFOLIA L., var. ALASKANA Gray.

The more extreme plants with oblanceolate or lanceolate to oblong or narrowly obovate cauline leaves is very marked, but in some colonies there is clear intergradation with the commoner forms with cauline leaves linear.

The following eastern American material is referred to var. ALASKANA. NEWFOUNDLAND: sandy and turfy seashore, Bard Harbor, St. John Bay, *Fernald & Long*, no. 29,093; peat and turf bordering gravelly limestone barrens, Pointe Riche, *Fernald, Long & Fogg*, no. 2039; grassy strand, Ingornachoix Bay, *Fernald, Wiegand & Kittredge*, no. 4068; peaty and gravelly open slopes, French (or Tweed) Island, Bay of Islands, *Fernald, Long & Fogg*, no. 434. QUEBEC: bonaventure conglomerate (calcareous) sea-cliffs, Bonaventure Island, *Fernald & Collins*, no. 1179. NOVA SCOTIA: old cellar, Trinity Cove, and rocky slope, Atlantic Cove, St. Paul Island, *Perry & Roscoe*, nos. 376, 377. See p. 56.

[1] SAMBUCUS PUBENS Michx., f. **calva**, f. nov., foliis ramulisque glabris.—Occasional through the range of the species, eastern Quebec to southern British Columbia, south to Connecticut, New Jersey, Ohio and Washington. TYPE: thickets in Fernald Pass, alt. about 850 m., between Mts. Mattaouisse, Fortin and Logan, July 13, 1923, *Fernald Griscom & Mackenzie*, no. 26,030 (in Gray Herb.).

Other forms of *S. pubens* are

S. PUBENS, f. **leucocarpa** (T. & G.), comb. nov. *S. pubens, β. leucocarpa* T. & G. Fl. ii. 13 (1841). *S. racemosa, f. leucocarpa* (T. & G.) House, N. Y. State Mus. Bull. 243–244: 69 (1923).

S. PUBENS, f. **xanthocarpa** (Cock.), comb. nov. *S. racemosa*, f. *xanthocarpa* Cock. Bull. Torr. Bot. Cl. xviii. 170 (1891). *S. pubens*, var. *xanthocarpa* Nieuwl. Am. Mid. Nat. iii. 310 (1914). *S. racemosa*, f. *chrysocarpa* Eames & Godfrey, RHODORA, xviii. 239 (1916). *S. racemosa*, f. *xanthocarpa* House, N. Y. State Mus. Bull. 243–244: 41 (1923).

S. PUBENS, f. **dissecta** (Britt.), comb. nov. *S. pubens dissecta* Britt. Mem. Torr. Bot. Cl. v. 304 (1894).

LOBELIA DORTMANNA L. The northern known limits in Newfoundland are on Notre Dame Bay and Bonne Bay. NOTRE DAME BAY: Tilt Cove, *Fernald, Wiegand & Darlington*, no. 6274. BONNE BAY: shallow pools in bog-barrens at 400–550 m. alt., tableland of Lookout Mt., *R. H. Kimball*, no. 61, *Fernald, Long & Fogg*, no. 2041. See p. 85 and MAP 8.

*SOLIDAGO HISPIDA Muhl., var. LANATA (Hook.) Fern. RHODORA, x. 87 (1908). The only Newfoundland station known is from PORT AU PORT BAY: dry exposed ledges and shingle on the limestone tableland, Table Mt., *Fernald & St. John*, no. 10,867.

S. HISPIDA, var. DISJUNCTA Fern. RHODORA, xvii. 2 (1915). To the type station (on the Humber) add BONNE BAY: turfy slopes below limestone crest (alt. 650 m.), Killdevil, *Fernald, Long & Fogg*, no. 2049.

S. HISPIDA, var. ARNOGLOSSA Fern. l. c. (1915). To the two stations originally published add the following. BONNE BAY: basaltic talus near mouth of Wallace's Brook, *Fernald, Long & Fogg*, no. 2046. BAY OF ISLANDS: peaty and gravelly thickets, French (or Tweed) Island, *Fernald, Long & Fogg*, no. 441. See p. 7.

S. CALCICOLA Fern. Already well known from the valleys of the Exploits and Harry's River (or Brook), now extended north to BONNE BAY: quartzite gravel and talus, slopes of Killdevil, *Fernald, Long & Fogg*, no. 2044. See p. 88.

*S. LEPIDA DC., var. ELONGATA (Nutt.) Fern. RHODORA, xvii. 9 (1915). BONNE BAY: gravelly shores and alluvial islands near mouth of Main River, *Fernald & Long*, no. 2060. See p. 91.

Already well known in the East from the Gaspé Peninsula, Anticosti, the Côte Nord and Lake St. John.

S. CANADENSIS L. Rare in Newfoundland. The following material is before me. VALLEY OF THE EXPLOITS: dry rocky clearings, Grand Falls, *Fernald, Wiegand & Darlington*, no. 6304. LOWER HUMBER VALLEY: dry limestone gravel, Hannah's Head, *Fernald & Long*, no. 2061. BAY OF ISLANDS: woods, Goose Arm, August 21, 1896, *Waghorne*. See p. 94.

BELLIS PERENNIS L. Although a frequent casual, persisting on garden refuse, the English Daisy is completely naturalized near the head of Humber Arm of BAY OF ISLANDS: pasture-turf, Crow's Gulch and turfy slope, Curling, *Fernald, Long & Fogg*, nos. 2073, 2074. BONNE BAY: turfy roadside, Woody Point, no. 2075. See p. 15.

ASTER RADULA Ait. The typical southern plant extends north to BONNE BAY: open marsh land, Bonne Bay, *Harlow Bishop*, no. 589; gravelly shores and alluvial islands near mouth of Main River, *Fernald, Long & Fogg*, no. 2062.

*A. ACUMINATUS Michx. Very local. BAY OF ISLANDS: spruce woods on southern slope of Lark Mt., *Fernald, Long & Fogg*, no. 460. REGION OF CAPE RAY: spruce thickets among the gneiss hills back of Port aux Basques, *Fernald, Long & Dunbar*, no. 27,139. See p. 4.

*A. NEMORALIS Ait., var. MAJOR Peck. Var. *Blakei* Porter. Known in Newfoundland only from REGION OF CAPE RAY: spruce thickets among the gneiss hills back of Port aux Basques, *Fernald, Long & Dunbar*, no. 27,141.

THE IDENTITY OF ASTER TRADESCANTI.—After the very extensive studies by Wiegand,[1] it might seem the part of discretion to let well enough alone and to refrain from raising anew the question of the identity of the long-baffling *Aster Tradescanti* L. The type of the latter (PLATE 261), however, is so definite and its similarity in every obvious point to one of the characteristic species occurring in Newfoundland, Quebec, Nova Scotia, New England and northern New York is so complete, that I feel that the long and vacillating career of *A. Tradescanti* as an unrecognizable species is now at an end.

After prolonged study of the bases of *Aster Tradescanti*, Asa Gray selected to stand as its type a specimen at the British Museum of a plant in the *Hortus Cliffortianus* herbarium, which had been raised from seed received from Morison of his *A. Virginianus ramosissimus serotinus parvis floribus albis Tradescanti*, Morison, Hist. iii. 121 (1715), "whence the name." In the Clifford herbarium Gray designated as "vera" the plant he had, rightly, selected as type; and in 1903, while photographing types at the British Museum, I made a silhouette-like and unfortunately vague portrait of it (PLATE 261), × ⅔. Of this type Wiegand concludes:

> This photograph does not seem to match any American form [of *A. paniculatus* Lam.] unless it be a shade condition of some normally wild form. The specimen may have come from shaded or crowded colonies in the garden. The heads are rather small, but are not fully developed, and possibly would have been larger if they had matured. The rameal leaves are more elliptic, more lax, and less rigid than in all forms of the species, but resemble somewhat those of *A. saxatilis*. Indeed, the photograph suggests *A. saxatilis* very much in the panicle and rameal leaves, but the cauline leaves are more divaricate. There is, however, no reason to believe that the low and slender *A. saxatilis* was in cultivation in Europe at that early period. In the opinion of the writer, this Morison plant [*i. e.* the Clifford plant, raised from Morison's seed] may very likely have been simply an undeveloped shaded individual of [*A. paniculatus*] var. *simplex*, but we have no way of proving this. It may, however, have been a hybrid form of *A. paniculatus* with *A. lateriflorus* or *A. vimineus*. . . . Because of this extremely vague and indefinite status of the name [*A. Tradescanti*] the writer believes that the best interests of taxonomy are served by abandoning it altogether.[2]

Wiegand's discussion of the type of *Aster Tradescanti*, above quoted,

[1] Wiegand, RHODORA, xxxv. 29–31 (1933).
[2] Wiegand, l. c.

contains the highly important statement that "the photograph suggests *A. saxatilis* very much in the panicle and rameal leaves"; but he dismisses without further consideration this very happy observation because, for some reason not clear to me, he felt that there is "no reason to believe that the low and slender *A. saxatilis* was in cultivation in Europe at that early date."

In my younger days, absorbing everything which pertained to the discovery and early exploration of my native state, I extracted from the "Voyages" of Champlain, Weymouth and others the amazing store of "first records" of plants of the region. Consequently, I am puzzled by Wiegand's dismissal of the periods of Morison and of Linnaeus (*Hortus Cliffortianus*) as too early for the eastern American *Aster saxatilis* to have been carried back to the gardens of Europe. Morison's account of *A. Tradescanti* was published in 1715: "Aster *Virginianus ramosissimus serotinus parvis floribus albis Tradescanti, Nobis. . . . florum* alborum, stellatorum, minimorum, ornati"; Linnaeus's account in Hort. Cliff. (408) in 1737. For several decades prior to Morison's date hundreds of eastern American species had been in European gardens, many of them appearing in the herbals of the 16th century; and the classic *Canadensium plantarum Historia* of Cornut, who dealt with American plants introduced into European gardens, was published in 1635.

Aster saxatilis (Fernald) Blanchard is a very neat plant of the river- and lake-shores of Newfoundland; of Nova Scotia; of Quebec, from Lake St. John to the neighborhood of the city of Quebec; of the Penobscot, Kennebec, Androscoggin, Merrimac, Connecticut and numerous smaller rivers of New England, including shores at Machias, Damariscotta and other early-explored coastal points; also shores of Lake Champlain and of smaller lakes in the Adirondack region. More than a century before Morison's account of *A. Tradescanti*, Champlain, with his highly botanical associate, Lescarbot, explored, and started colonies on, the coasts of Nova Scotia, Maine and elsewhere in eastern America. They even ascended the Penobscot to the very ledges along the Stillwater Branch of that river, which are the type-locality of *A. saxatilis;* and they recorded the necessity of there ceasing their up-river explorations because of the impossibility of taking their ships past the ledge-crowded water-falls. They also spent some time in the region of Machias and of Damariscotta. At approximately the same time (1605), Captain George Weymouth,

exploring the same coasts, specially recorded the plants seen and took back to England seeds and roots (among them the Weymouth Pine, (*Pinus Strobus*). Surely, *Aster saxatilis* had plenty of opportunity, prior to 1715, to reach European gardens from Nova Scotia or Maine, to say nothing of Newfoundland, Quebec and the Lake Champlain region.

It is, consequently, worth while to reproduce the photograph, poor as it is, of the plant in the Clifford herbarium, properly selected by Gray as the type of *Aster Tradescanti* (PLATE 261) and, likewise, to show, but on smaller scale (× ½), the top of a characteristic plant (PLATE 262) from Digby Neck (opposite Weymouth) in Nova Scotia, a specimen labeled and cited by Wiegand as typical *A. saxatilis*. This wild specimen, *Fernald & Long*, no. 22,762, of "the low and slender *A. saxatilis*," to use Wiegand's words, is 2 feet, 2½ inches high, the slender stems ("cauliculos graciles") of the plant cultivated by Morison were "binos aut tres pedes altos." No. 22,762 is a common and attractive plant of the region where, in 1605, the French sailed through Digby Gut to found Port Royal (now Annapolis Royal); and a specimen sent by *Mrs. Agnes M. Ayre* from the Avalon Peninsula in Newfoundland comes from a region where European colonists had settled as early as 1580.

The opportunities for seeds or roots of *Aster saxatilis* to have been carried to Europe before 1715 were, as sufficiently emphasized, apparently more numerous than Wiegand realized; and the similarity of a loosely grown indigenous specimen of it to the type of *A. Tradescanti* is so striking (even to the "*folia* palmum longa, salignea, angusta, . . . in ambitu sparsis *denticulationibus* serrata" of Morison's account) that I find myself fully subscribing to Wiegand's statement, that "Indeed, the photograph suggests *A. saxatilis* very much." It seems to me so satisfactory a match that, as one of the godfathers of the latter, I find myself abandoning the name *A. saxatilis* (Fern.) Blanchard (1904) in favor of A. TRADESCANTI L. (1753). That Asa Gray was baffled by the type of *A. Tradescanti* was quite natural, for, like Wiegand, he was trying to fit it to some native specimen of *A. paniculatus*. In Gray's time there was no material of *A. saxatilis* in American herbaria.

ERIGERON HYSSOPIFOLIUS Michx., var. VILLICAULIS Fern. RHODORA, xvii, 17 (1915). Originally described from Table Mt., Port au Port Bay. Occasional on the West Coast northward to the Straits; also on Anticosti. The following additional Newfoundland stations may be

recorded. HA-HA BAY: turfy or gravelly shelves, crests or talus of diorite, Ha-Ha Mt., *Pease & Griscom*, no. 29,137. STRAITS OF BELLE ISLE: dry soil, Poverty Cove, *M. E. Priest*, no. P1; turfy or peaty pockets in limestone ledges, Sandy (or Poverty) Cove, *Fernald, Long & Dunbar*, no. 27,143; dry horizontal limestones, Rock Marsh, Flower Cove, *Fernald, Long & Dunbar*, no. 27,142. ST. BARBE BAY: limestone barrens near Ice Point, *Wiegand, Gilbert & Hotchkiss*, no. 29,136; ST. JOHN BAY: peaty margins of dry limestone barrens, Old Port au Choix, *Fernald, Long & Fogg*, no. 2071. INGORNACHOIX BAY: dry peaty and turfy limestone barrens, Gargamelle Cove, no. 2072; calcareous rocks and talus, entrance to Port Saunders Harbor, *Fernald, Wiegand & Kittredge*, no. 4136.

Var. *villicaulis* is not always villous. Its chief characters are its low and depressed habit, crowded lower leaves (mostly obtuse), and its scapiform peduncles.

(*To be continued*)

DUMONTIA IN MAINE.—In RHODORA of March, 1923, pp. 33–37, Setchell reported *Dumontia filiformis* (Fl. Dan.) Grev. from Newport, R. I., and suggested that this alga probably occurred further north in New England. Lewis and Taylor confirmed this by a further collection in Buzzard's Bay, Massachusetts. See RHODORA, October, 1928, p. 195. It had probably been overlooked because of its similarity in appearance to the abundant *Halosaccion*. Setchell's prediction in another case has been verified, for on May 23, 1933, I found it growing abundantly in a tidal pool at Hale's Beach, North Brooklin, Maine.

Perhaps a hint to the amateur collector may not be amiss. As is well known, photosynthesis takes place under the influence of the rays at the red end of the spectrum. Since these rays are soonest absorbed by sea water, leaving only the violet, the deeper growing *Rhodophyceæ* produce a fluid which restores the red color so necessary to their life processes. When *Dumontia* grows in shallow water or at half tide, it often fails to form this phycoerythrin and appears yellow or brownish and may easily be mistaken for one of the brown algae. Often the red color is completely absent, or may appear for only a few millimeters at the base, where that part of the plant is shaded. Two years ago *Halosaccion*, which is believed to be a near relative of *Dumontia*, was growing in this same pool and showed this same characteristic.

Specimens will be placed in the Farlow Herbarium and the National Herbarium.—R. E. Schuh, Brooklin, Maine.

SOME FORMS OF GRASSES[1]

M. L. Fernald

Bromus latiglumis (Scribn.) Hitchc., forma **incanus** (Shear), comb. nov. *B. purgans incanus* Shear, U. S. Dept. Agric. Div. Agrost. Bull. xxiii. 41 (1900). *B. incanus* (Shear) Hitchc. Rhodora, viii. 212 (1906). *B. altissimus*, forma *incanus* (Shear) Wiegand, Rhodora, xxiv. 91 (1922). *B. ciliatus*, var. *incanus* (Shear) Farwell, Am. Midl. Nat. x. 204 (1927).

This is certainly only a pilose-sheathed form of the ordinarily glabrous-sheathed plant. The strongly costate, prolonged and closed sheaths with chartaceous and auricled flanges are characteristic of the species and at once separate it from *B. purgans* L. and *B. ciliatus* L., both of which have V-shaped orifices to the flangeless sheaths. As Shear correctly stated in the original publication, it "is very near *B. purgans latiglumis*, differing from it in having the sheaths densely soft pilose-pubescent." Glabrous-sheathed and pilose-sheathed forms occur in nearly all our species of *Bromus;* but unless they have other characters and distinctive ranges they should not be treated as species.

The name *B. latiglumis* (Scribn.) Hitchc. (1906) is here taken up in place of *B. altissimus* Pursh (1814), not Gilib. (1792).

Bromus inermis Leyss., forma **villosus** (Mert. & Koch), comb. nov. *Festuca inermis*, β. *villosa* Mert. & Koch, Deutschl. Fl. i. 675 (1823).

B. inermis, forma **aristatus** (Schur), comb. nov. *B. inermis*, var. *aristatus* Schur, Enum. Pl. Trans. 805 (1885).

Bromus mollis L., forma **leiostachys** (Hartm.) comb. nov. *B. mollis*, β. *leiostachys* Hartm. Handb. Skand. Fl. ed. 2: 33 (1832).

This is the form of *Bromus mollis* with smooth spikelets, which has passed in America as *B. hordeaceus* L., var. *leptostachys* (Pers.) Beck or *B. hordeaceus*, f. *leptostachys* (Pers.) Wiegand, Rhodora, xxiv. 90 (1922). It has also been called *B. mollis*, f. *leptostachys* (Pers.) Neuman, Sv. Fl. 740 (1901).

Two errors are involved in the names cited in the preceding paragraph. In the first place, Holmberg, Bot. Notis. (1924) 325, shows with some conclusiveness that we have been wrong in uniting *B.*

[1] Published with aid of a grant to Rhodora from the National Academy of Sciences.

mollis L. and *B. hordeaceus* L.; the latter is a very different matted or prostrate plant of the coasts from southern Scandinavia to England and France; *B. mollis* being the widespread weed. In the second place, *B. mollis* β. *leptostachys* Pers. (1805) does not belong with *B. mollis*, but is referred without question by Rouy and by Holmberg to the synonymy of *B. commutatus* Schrad. Although the plant intended by Beck von Mannagetta by his *B. hordeaceus*, var. *leptostachys* may be the smooth form of *B. mollis*, the name rests eventually for its typification upon the plant of Persoon, which is identified as *B. commutatus*. Incidentally, *B. commutatus* Schrad. (1806) is antedated by *B. pratensis* Ehrh. in Hoffm. Deutschl. Fl. ed. 2, ii. 52 (1800). Ehrhart's name, originally published by him in 1791 as a *nomen nudum*, was validated by its proper description by Hoffmann.

B. mollis, f. *leiostachys* is well displayed in Amer. Gr. Nat. Herb. no. 891, collected by Professor Hitchcock and distributed as *B. racemosus* L.

Agrostis stolonifera L., forma **aristigera**, f. nov., lemmatibus aristigeris.—Rarely in the range of the common awnless form. Type: along brook in meadow, Granville, Massachusetts, June 27, 1914, *F. C. Seymour* (in Gray Herb.).

Agrostis stolonifera is now generally accepted as the proper name for the Redtop, which has long passed as *A. alba* L. Unfortunately, the latter was based by Linnaeus upon the 1-flowered form of *Poa nemoralis* L. *A. stolonifera* as originally published in L. Sp. Pl. i. 62 (1753) was a mixed species, consisting in part of *A. verticillata* Vill., in part of Redtop; but most recent botanists are now agreed in restricting the name to the latter species, the element in the complex occurring in the region familiar to Linnaeus.

Agrostis perennans (Walt.) Tuckerm., forma **chaetophora**, f. nov. Lemmatibus aristigeris.—Type: Huntingdon Co., Pennsylvania, August, 1865 *J. R. Lowrie* (in Gray Herb.).

Agrostis perennans, var. aestivalis Vasey, forma **atherophora**, f. nov. Lemmatibus aristigeris.—Type: island in Lac Tremblant, Co. Terrebonne, Quebec, August 1, 1922, *J. R. Churchill* (in Gray Herb.).

The types of both the above forms of *Agrostis perennans* were distributed as *A. canina* L. This misindentification arose, unquestionably, through the very unsatisfactory keys in American manuals, which rely upon the presence or absence of an awn as a fundamental specific character. In view of the fact that in northeastern America the commonly awnless *A. stolonifera* L., *A. tenuis* L., *A. scabra* L.,

A. scabra var. *septentrionalis* Fern. and *A. elata* (Pursh) Trin. all have awned forms and that the commonly awned *A. geminata* Trin., *A. canina* L. and *A. borealis* Hartm. may sometimes be awnless, the inadequacy of such keys is apparent. It is now to be expected that the vernal *A. hyemalis* (Walt.) BSP. (*A. antecedens* Bickn.) will be found to have awned colonies.

Agrostis perennans is here treated as the plant with the mostly short-pedicelled spikelets (many pedicels shorter than the spikelets) appressed-ascending. Var. *aestivalis* is the woodland plant (*A. Schweinitzii* Trin.) with more open panicle, the mostly divergent spikelets chiefly on longer pedicels (1–3 times as long as spikelets).

Aristida longespica Poir., var. **geniculata** (Raf.), comb. nov. *A. geniculata* Raf. Am. Mo. Mag. ii. 119 (December, 1817).

In his *North American Species of Aristida*,[1] Hitchcock rightly took up for *A. gracilis* Ell. Bot. S. C. and Ga. i. 142, t. 8, fig. 3 (1816) the earlier name, *A. longespica* Poir. in Lam. Encyl. Suppl. i. 452 (1810). Hitchcock then stated that the type of *A. longespica* "could not be found . . . but the description . . . can apply only to what has commonly been called *A. gracilis* Ell." Later, however, Henrard, in his very exhaustive studies of Aristida, illustrated the fruiting spikelet "*From type specimen*": "I had at my disposal a few spikelets of the type. They were found, accurately packed up in an envelope, in Balansa's Herbarium."[2] Henrard's figure from the type of *A. longespica* shows the lemma (up to the forking of the awns) 5 mm. long, the divergent middle awn 8.6 mm. long, and the lateral awns 3 mm. long. This figure from the type well accords with Poiret's original diagnosis and his fuller description: "aristis valde inaequalibus" and "la valve de la corolle fort étroite, subulée, terminée par trois arêtes; celle du milieu divergente, une fois plus longe que la corolle; les deux autres beaucoup plus petites."

Elliott's figure of his *A. gracilis* (as *Gracilis*) was very carelessly drawn, the sketch of the inflorescence showing most of the awns as in the Poiret type of *A. longespica*, but the three lowest spikelets with lateral awns subequal, the enlarged detail showing them subequal and the central one (even when enlarged) shorter than in the life-size habit-drawing! Elliott's diagnosis, however, shows that he was describing the same species as Poiret's: "aristis lateralibus brevibus, erectis, intermedia longiore, patente."

[1] Hitchc. Contrib. U. S. Nat. Herb. xxii. 538 (1924).
[2] Henrard, Crit. Revis. Gen. Aristida, i. 304, 305 (1926).

Asa Gray, familiar with the common northern plant ("coast of Mass. and from Illinois southward") with "*lateral awns varying from one third to fully half the length of the horizontally bent middle one* . . —Middle awn 6″–9″ [1.6–1.9 cm.] long'' and considering that to be true *A. gracilis,* described the shorter-awned plant of Elliott (and of Poiret before him) as *A. gracilis* var. *depauperata,* with the lateral awns "one fifth to one third its [middle awn's] length . . . on micaceous hills near Philadelphia."—Gray, Man. ed. 5: 618 (1867).

In the Gray Herbarium and in the large series in the Herbarium of the New England Botanical Club I find no characteristic short-awned *Aristida longespica* (*A. gracilis* Ell., *A. gracilis,* var. *depauperata* Gray) from north of southeastern Pennsylvania. In the interior it extends north to Ohio and southern Michigan. In this extreme, typical southern *A. longespica,* the central awn varies from 5 to 13 mm. long, the lateral being 1/5–1/3 as long (1–4 mm.).

In the plant of New England, southern New York and New Jersey, as shown in these collections (this extreme extending somewhat generally in the interior from the Gulf of Mexico north to northern Ohio and northern Indiana), the plant is that which Asa Gray considered to be characteristic *A. gracilis:* with the central awn 1–2.1 cm. long, the lateral 2/5–4/5 as long (4–15 mm.). This longer-awned extreme being the general one in New England and southern New York, while the typical short-awned plant is rare or unknown north of southeastern Pennsylvania, it is clear that the segregation made in 1867 by Gray was well founded, although he had the typification confused.

That the longer-awned extreme is the plant well described by Rafinesque there can be hardly any question. His characterization was clear and the localities indicate clearly the long-awned northern plant:

14. *Aristida geniculata.* Chaff slender, upright, round, base geniculated, leaves filiform, convolute striated rough backwards, ligules ciliated; panicle racemose, contracted elongated, glumes equal, keel and bristle rough, pedicel of the glumelles hairy, glumelles smooth convolute, bristle longer twisted rough, divisions very long, nearly equal.—Obs. Very common on the Hempstead plains, and on the sea-shore near Oyster Bay, Gravesend, &c. on Long-Island. Annual: next to *A. Stricta* of Micha[u]x, many stems often grow together, they rise about one foot. It blossoms in August and September.

A NEW SPECIES OF GLYCERIA FROM THE GREAT SMOKY MOUNTAINS[1]

W. A. Anderson

On July 21, 1929, the writer was one of a party which made a trip to Clingman's Dome, one of the highest elevations of the Great Smoky Mountain ridge which divides North Carolina from Tennessee. Another member of the party was Professor H. M. Jennison of the Department of Botany, University of Tennessee, others were members of the Smoky Mountains Hiking Club. On this occasion the hikers took to horseback, an opportunity not often afforded in the Great Smokies, where most of the trails are too steep for horses.

We took off early in the morning from an inn near Gatlinburg, Tennessee, where we had spent the preceding night. We followed the old Indian Gap trail up to the Stateline ridge, a trail which is reputed to have been travelled since long before the Civil War, perhaps since the days when the Cherokees owned all of that country. It is not much travelled now, but is clearly marked, and offered no difficulty to our horses. For the most part the path follows a stream, one of the numerous tributaries of the Little Pigeon River, and passes through forests of enormous sugar maples, buckeyes, and yellow poplars, with the everpresent underbrush of rhododendrons. Occasionally there are openings in the forest, and on that day they were full of *Monarda didyma* and *Rudbeckia laciniata*, in full bloom. Indian Gap is a low place in the divide, a true wind-gap, with a mountain meadow of several acres in it. In this case the meadow was made up of an almost pure stand of timothy, which gives substance to the story that Indian Gap Trail is an old one.

It was near Indian Gap that we collected *Senecio Rugelia* Gray, one of the rare endemic plants of the region, and one so unlike most *Senecios* of the eastern United States that we were puzzled for some time as to its identity.

From Indian Gap we proceeded southwestward along the Stateline ridge, passing through groves of conifers and innumerable openings, almost constantly going up, until we reached Clingman's Dome itself, a broad, rounded top, covered with the characteristic evergreen forest of the region, with *Abies Fraseri* dominant, and a dense growth of ferns, mostly *Thelypteris spinulosa*, var. *americana*, in the thick

[1] Published with aid to Rhodora from the National Academy of Sciences.

cushion of mosses on the forest floor. *Oxalis montana* Raf. is also abundant and conspicuous. The trees were so dense that there was no view from the Dome, and we were glad to climb the tower recently erected by the U. S. Coast and Geodetic Survey, from which we not only saw the view, but also managed to reach a few cones of the Fraser's fir.

On these crests the dense growth of mosses and the leaf-mould of ages hold water like a sponge. Our horses were constantly miring, and though the grades along the ridge are comparatively gentle, this was really the most trying part of the journey. The soggy ground is not confined to the forest, but extends into many of the openings along the ridge, making what in New England would be called swales, although there is a two- or three-mile slope on either side. It was in one of these miry openings that we collected a large grass, which we later identified as *Glyceria grandis*, according to Gray's Manual a range extension of three or four hundred miles. We were of course quite well pleased with this find.

Subsequent study has shown that this grass differs from *G. grandis* in several respects, though the two are clearly related. It is not referable to any other species of *Glyceria*, so is proposed as a new species.

Glyceria **nubigena**, sp. nov. *G. grandi* similis; culmis 15 dm. altis laevibus; nodis contractis; vaginis laevibus, nervis transversis prominentibus; ligulis membranaceis 2 mm. longis; laminis 3–5 dm. longis 5–10 mm. latis, supra minute scabris; paniculis amplis; spiculis

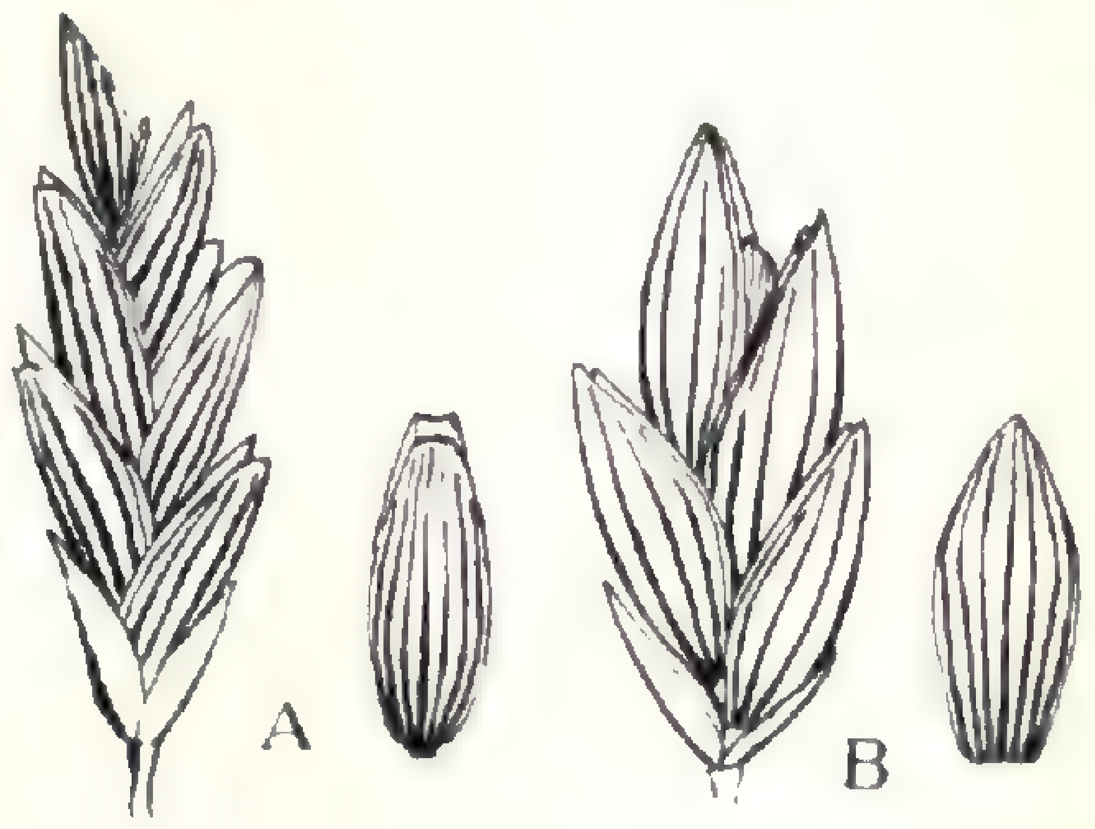


Fig. A. Glyceria grandis: spikelet and lemma, × 5.
Fig. B. G. nubigena: spikelet and lemma, × 5.

4–5 mm. longis; floribus 3–5, supremo abortivo truncato; glumis lanceolatis acutis purpureis, prima 1.5 mm. longa, secunda 2 mm. longa; lemmatibus 2.6–3 mm. longis acutis prominente septemnervosis purpureis; paleis coriaceis lemmata aequantibus.

G. grandis Wats. has ligules which are 4–5 mm. long, translucent glumes, larger spikelets but smaller lemmas which are blunt or erose

at the tip, instead of acute as in the species here described; the uppermost floret reduced to a mere scale.

It is a familiar story that many plants of the Canadian forest are found southward along the Alleghanies and reach their southern limits in the mountains of Tennessee, the Carolinas and Georgia. *Picea rubra, Clintonia borealis, Streptopus roseus, Thelypteris spinulosa,* var. *americana, Oxalis montana, Pyrus americana* are familiar examples. A few genera have a species widely distributed in the north, and a closely related endemic species in the southern Alleghanies. To such belong *Abies balsamea* and *A. Fraseri*. *Glyceria grandis* and the species here described constitute another such pair, with the former growing from "Quebec to Alaska, s. to Pa. and westw.," and the latter endemic in the Great Smoky Mountains.

Duplicates of the type collection, *Anderson and Jennison*, no. 1418, have been placed in the herbarium of the University of Tennessee and in the Gray Herbarium.

The State University of Iowa,
Iowa City, Iowa.

A third Station for Waldsteinia fragarioides in Maine.—On May 14, 1933 the writer and Mr. H. M. W. Haven, of Portland, discovered a station for this local plant, in Monmouth, Maine. The plants, which were just coming into flower, occupy an area along both sides of the road from Sabattus to Monmouth, at a place about two miles south of the depot at Monmouth. They extend from the edge of the ditch to some distance into the hardwood growth which covers this level section, and are abundant over a stretch of upwards of two hundred feet in length.

The Benton station, reported by Mr. John C. Parlin[1] in 1922 also appears to be sizable.

The station in the vicinity of Bethel[2] reported by Dr. N. T. True over seventy years ago seems to have been lost to view, though it is to be hoped that it may be rediscovered or reported in the near future by some local or visiting collector.—Arthur H. Norton, Museum of Natural History, Portland, Maine.

Volume 35, no. 416, including pages 263–294 and 6 plates, was issued 1 August, 1933.

[1] 1922, Parlin, Rhodora **24**: 124.
[2] 1862, Goodale, Proc. Portland Soc. Nat. Hist. **1**: 46.

Aster Tradescanti: portion of plant, × ½, of *A. saxatilis*, from Nova Scotia.

1 0 1933

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB

Conducted and published for the Club, by

MERRITT LYNDON FERNALD, Editor-in-Chief

JAMES FRANKLIN COLLINS
CHARLES ALFRED WEATHERBY } Associate Editors
LUDLOW GRISCOM

Vol. 35. October, 1933. No. 418.

CONTENTS:

A Study of the Rocky Mountain Species of the Multiflori Section of Aster. *R. A. Nelson* 323

Recent Discoveries in the Newfoundland Flora (continued). *M. L. Fernald* 327

On the Distribution of Sorocarpus. *R. E. Schuh* 347

Notes on Rocky Mountain Plants. *E. H. Kelso* 347

Heterochromism in Arctostaphylos Uva-ursi, var. coactilis. *M. L. Fernald* 348

The New England Botanical Club, Inc

8 and 10 West King St., Lancaster, Pa.

Room 1001, 53 State St., Boston, Mass.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price, $2.00 per year, net, postpaid, in funds payable at par in United States currency in Boston; single copies (if available) 20 cents. Volumes 1–8 or some single numbers from them can be supplied only at advanced prices which will be furnished on application. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be considered for publication to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than two pages of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

M. L. FERNALD, 14 Hawthorn Street, Cambridge, Mass.

Subscriptions (making *all remittances* payable to RHODORA) to

Ludlow Griscom, 8 W. King St., Lancaster, Pa., or Museum of Comparative Zoology, Cambridge, Mass.

Entered at Lancaster, Pa. Post Office as Second Class Mail Matter.

INTELLIGENCER PRINTING COMPANY

Specialists in Scientific and Technical Publications

EIGHT WEST KING ST., LANCASTER, PA.

CARD-INDEX OF NEW GENERA, SPECIES AND VARIETIES OF AMERICAN PLANTS, 1885 TO DATE.

For American taxonomists and all students of American plants the most important supplement to the Index Kewensis, this catalogue in several ways exceeds the latter work in detail, since it lists not only the flowering plants, but ferns and other vascular cryptogams, and includes not merely genera and species, but likewise subspecies, varieties and forms. A work of reference invaluable for larger herbaria, leading libraries, academies of sciences, and other centers of botanical activity. Issued quarterly, at $22.50 per 1000 cards.

GRAY HERBARIUM of Harvard University,
Cambridge, Mass., U. S. A.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. Day. Leatherette. Pocket size. Invaluable for collector's memoranda and herbarium records. Published and sold by the Gray Herbarium, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

MEMOIRS OF THE GRAY HERBARIUM. A series of illustrated quarto papers issued at irregular intervals, sold separately.

No. III. The Linear-leaved North American Species of Potamogeton, Section Axillares, by M. L. Fernald. 183 pp., 40 plates, 31 maps. 1932. $3.00.

Gray Herbarium of Harvard University, Cambridge, Mass.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3/4 in. 1 year $4.00, 6 months $2.50.

Antennaria columnaris, × 1; insert × 2.

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 35. October, 1933. No. 418.

A STUDY OF THE ROCKY MOUNTAIN SPECIES OF THE MULTIFLORI SECTION OF ASTER[1]

Ruth Ashton Nelson

No doubt it will be considered a very bold venture for an inexperienced student to make her début in botanical literature with a paper on a group of the genus *Aster* which has been the despair of many more experienced and wiser botanists than she. The results here published are due to the stimuli of repeated exasperations when attempting to place correctly members of this group which come frequently to hand for determination. No doubt the appearance of more discussion in this much discussed and too much named group, will stimulate exasperation among some workers but after several weeks of study the author feels that her results will bear publishing and sincerely hopes that they may be of some value to any who may be bewildered among the *multiflori-commutati* section of *Aster*, as she has been.

This group falls naturally into two divisions.

First, those plants that for years have been called *Aster multiflorus* Ait., but for which we must now accept the name *Aster ericoides* L., as has been pointed out by Mr. K. K. Mackenzie[2] and Dr. S. F. Blake.[3] This plant is characterized by an excurrent stem from which branches ascend and recurve bearing numerous heads in more or less secund fashion. The heads are rather uniformly small in typical material from eastern states but in our western plants tend to be larger and to show much variation in size. The involucres of these heads are well imbricated with bracts in 3–5 series. In general this

[1] Published with aid to Rhodora from the National Academy of Sciences.

[2] Rhodora **28**: 65. 1926.

[3] Rhodora **32**: 136. 1930.

is a tall plant ranging in height from 1 to 6 or 7 feet and often widely branched and bushy. Here the caespitose rootstocks often result in the formation of clumps each made up of several stems. Although *A. ericoides* becomes much more variable in its western range, as do many other species, nevertheless it always shows in some degree the characters noted above. Several specimens are at hand of Rocky Mountain plants which can not be distinguished from those of Iowa and Illinois. After long consideration it is impossible to recognize the various segregates which have been made and it seems wisest to call them all forms of a variable species.

Second, is the group separated by Dr. Gray under the name *A. commutatus*, and its allies, which has two characters which amply distinguish it from *A. ericoides*. In the first place its usually solitary heads are borne at the ends of leafy branches which are not recurved. Here the excurrent habit of the main stem is not so conspicuous and is never combined with the ascending, recurved, secund branches of the latter. In the second place, instead of forming clumps these plants form "loose but somewhat extensive masses through a system of branching rhizomes," as is very well explained by Dr. Greene in his original description of *A. adsurgens*. This character has been repeatedly observed by the author as exhibited by *A. commutatus* in the vicinity of Estes Park, Colorado. Within the *commutati* group the character of the bracts has been considered the fundamental distinguishing point, and that of the pubescence of stems and bracts of second importance.

Variation is prevalent, and numerous intermediates occur exhibiting the parent characters in all possible combinations, but here it is possible to separate at least three species satisfactorily if one will spend some time in study of those characters which are of specific importance in this group, and gain a mental concept of each specific unit. Perhaps this can only be gained by the study and comparison of a large number of specimens, but in an attempt to make these characters more readily observable to the average botanist a short key has been prepared.

One factor which contributes to the confusion surrounding this entire section is the wide range of nearly all of the forms involved. It is impossible to delimit the species geographically as the ranges of all overlap extensively.

This paper is based on the careful study of over a hundred sheets of

specimens in the Rocky Mountain Herbarium, comprising material from all the states west of the Mississippi except California and Nevada. Most emphasis has been put on the essentially Rocky Mountain species because the bulk of the material at hand represents plants of New Mexico, Colorado, and Wyoming.

Stem excurrent, with ascending, recurved branches; heads numerous, more or less secund; rootstocks caespitose .... *A. ericoides*
Stem branched or sometimes excurrent but branches not recurved-secund, terminated by solitary, or rarely few, heads; rootstock creeping.
  Bracts well imbricated in 3–5 distinct series; pubescence hispid, spreading .... *A. adsurgens.*
  Bracts nearly equal in length or the outer at least half equaling the height of the involucre.
    Bracts slightly imbricated, thick, strigose, squarrose .. *A. commutatus.*
    Bracts about equal in length, thin, glabrate, not squarrose .... *A. falcatus.*

Aster ericoides L. Sp. Pl. **2**: 875. 1753. *A. multiflorus* Ait. Hort. Kew. **3**: 203. 1789. *A. hebecladus* DC. Prodr. **5**: 242. 1836. *A. scoparius* DC. l. c. not *A. scoparius* Nees. *A. multiflorus* var. *stricticaulis,* T. & G. Fl. N. A. **2**: 125. 1842. *A. polycephalus* Rydb. Bull. Torr. Bot. Club **33**: 153. 1906. *A. stricticaulis* (T. & G.) Rydb. Flora of the Rocky Mountains 885. 1917.

Representative Specimens. New Mexico: Las Cruces, *Wooton* 465; Mangas Springs, *Metcalfe* 781; Jemez Mts., *Castetter* 669; Bernalillo, *Castetter* 900. Colorado: Mesa Verde, *Haas* 80 and *Bader* 5; Arvada, *Clokey* 3908; Colorado Springs, *Warren* 1927; Boulder, *Ramaley* 2600 and 9757; New Windsor, *Osterhout* 3183; Fort Collins, *Cowan* 2697; Meeker, *Robbins* 7182. Wyoming: Hanna Creek, *Willits* 396; Lusk, *A. Nelson* 9604; Thermopolis, *A. Nelson* 9263. Montana: Bozeman, *Blankinship* Aug. 30, 1899. Idaho: Region of the Coeur d'Alene Mountains, *Leiberg* 1588. Washington: Hunters, *E. Nelson* 1002; Yakima, *E. Nelson* 1168. North Dakota: Jamestown, *C. C. Schmidt,* Sept. 8, 1897; Stump Lake, *Tufte* 286. South Dakota: Vicinity of Brookings, *Williams* Aug. 30, 1894; Custer, *McIntosh* 633.

The range of this species is from New England to the Pacific coast across the northern and central states and south into New Mexico, and in varying forms it has a still wider distribution.

Aster adsurgens Greene, Pitt. **4**: 216. 1900. *A. crassulus* Rydb. Bull. Torr. Bot. Club. **28**: 504. 1901. *A. exiguus* Rydb. l. c. 505. Probably not A. *multiflorus* var. *exiguus* Fernald.

Representative Specimens. Colorado: Piedra, *Schmoll* 1476; Bedrock, Montrose Co., *Walker* 396; La Veta, *Vreeland* 190a[1]; Pagosa

[1] The type number of *A. crassulus* Rydb. in the citation, Bull. Torr. Club **28**: 505. 1901, is given as *690a* with the same date which our sheet *190a* carries; undoubtedly there has been an error in copying the number but we are unable to determine which is correct.

Springs, *Baker* 637; Naturita, *Payson* 611; near Gunnison, *Warfel* Aug. 1926; Alathie, *Cowan* 2698 and 2992; Rye, Pueblo Co., *Clokey* 4343 and 4344; near Boulder, *Ramaley* a202 and a213. Wyoming: Buffalo, *Tweedy* 3106; Sundance, *A. Nelson* 9701; Sweetwater, *A. Nelson* 2891; above Sheridan, *Sharp* 233. South Dakota: Harding Co., *Visher* 694; Deerfield, *McIntosh* 840. Eastern Oregon: Grand Ronde Valley, *Cusick* 3398. Eastern Washington: Near Spokane, *Turresson* 69. Arizona: Flagstaff, *Hanson* 8.

It is with reluctance that I substitute a name which has been known only in synonomy for one which has become well established, but there is no other course open to me. Dr. Rydberg reduced *A. adsurgens* Greene under *A. commutatus* but a careful comparison of his original description and that of Greene reveals the interesting fact that Greene described, not *A. commutatus*, but the same species which Rydberg a year later described as *A. crassulus*. Their only point of difference is in the amount of pubescence on the leaves, which we know is a character subject to much variation within any species of this group. Leaf-size as given by Greene is not comparable with that given by Rydberg, for the former is speaking only of leaves on sterile shoots. The involucre of *A. adsurgens* as described by Greene definitely separates this plant from *A. commutatus*, under which for years it has been reduced to synonomy.

Aster commutatus (Torrey & Gray) Gray, Syn. Fl. **1**: 185. 1884. *A. ramulosus* β. Lindl. in DC. Prodr. **5**: 243. 1836. *A. multiflorus* var. *commutatus* T. & G. Fl. N. A. **2**: 125. 1842. *A. incanopilosus* Sheld. Bull. Torr. Bot. Club **20**: 286. 1893. *A. multiflorus* of western authors, in part.

Representative Specimens. Colorado: Estes Park, *Ashton* 234; Piedra, *Schmoll* 1442; Norwood Hill, San Miguel Co., *Walker* 428. South Dakota: Perkins Co., *Visher* 645. Wyoming: Centennial, *Goodding* 2111; Laramie, *A. Nelson*, 153 & 10644; 15 miles southwest of Laramie, *Merrill & Wilcox* 1170. Minnesota: Battle Lake, *Sheldon*, Aug. 1892. Kansas: Rockport, *Bartholomew* 23.

The Colorado and South Dakota specimens are typical, in my estimation. Those from Wyoming show some variation of the involucres. That of Merrill and Wilcox, and Dr. Nelson's 10644 has rather short outer bracts and the bracts of Dr. Nelson's 153 and of the Goodding specimens show very little tendency to be squarrose. The center of distribution seems to be Colorado, from which it extends eastward and northward, often in slightly varying forms.

Aster falcatus Lindl. in DC. Prodr. **5**: 241. 1806. *A. ramulosus* Lindl. l. c. 243. *A. Cordineri* A. Nelson Bot. Gaz. **40**: 64. 1905.

Representative specimens. COLORADO: Estes Park, *Cooper* 151 (type of *A. Cordineri*), *Osterhout* 5470, *Ashton* 345; The Gunnison watershed, *Baker* 626; Trail Glen, *F. E. and E. S. Clements* 67. WYOMING: *A. Nelson*, Meyersville, 2847 (cotype of *A. Cordineri*); Centennial, 8792; Laramie, 1170; C. Y. Ranch, Big Muddy, 598; Sheridan, 8484. NORTH DAKOTA: Pingree, Stutsman Co., *Lunell*, Aug. 12, 1902.

The author has not seen true *Aster falcatus* Lindl. from Arctic America but it seems unlikely that our Rocky Mountain plant could belong to that species in spite of the extensive ranges characteristic of species in this section. There are no specimens at hand from the Northwest, which is well represented in the Rocky Mountain Herbarium by other species. Our plant does not agree entirely with Lindley's description in the Prodromus. The leaves of our plants are not noticeably falcate and the branches must be considered leafy rather than "paucifoliis," neither are they 3-nerved, a character given for *A. falcatus* by Macoun.[1] However, without seeing authentic *A. falcatus* Lindl. I hesitate to depose the name which Dr. Rydberg has accepted and made familiar, but if it is later shown that our plants are not the same as those from the far north the name *Aster Cordineri* A. Nelson becomes the correct name of this species. It is well represented by material from the mountainous regions of the central and northern part of Colorado and of Wyoming, and extends into North Dakota.

ROCKY MOUNTAIN HERBARIUM,
Laramie, Wyoming.

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. FERNALD

(*Continued from page 315*)

THE GENUS ANTENNARIA IN NEWFOUNDLAND.—In 1924 I published a brief synopsis of *The Dwarf Antennarias of Northeastern America*, RHODORA, xxvi. 95–102 (1924). At that time 6 species and 2 varieties of the genus were known in Newfoundland. Now, after four additional seasons in the field, we know 16 species and 2 varieties of *Antennaria* on the Island. In view of the great technical difficulty of the group, a new key to the Newfoundland representatives of the genus is offered and the new species are illustrated.

[1] Canadian Plants 1: 223. 1883.

a. Basal leaves erect, oblanceolate to elliptic-acuminate, 2–18 cm. long, similar to the cauline ones: staminate and pistillate plants intermixed, becoming 1–2.5 dm. high; the inflorescences of the former soon shriveling: involucres deep-brown to blackish: plants sparingly or not at all stoloniferous. . . . . .1. *A. eucosma.*

a. Basal leaves spreading, forming depressed rosettes, strongly contrasting in outline with the ascending cauline leaves: only the pistillate plants known; these humifuse or freely stoloniferous. . . . *b.*

b. Larger basal leaves 1–5 mm. wide, blunt or only obscurely or minutely mucronulate, whitened above: flowering stems only 0.5–18 cm. high: involucres deep-brown to blackish or, if pale, at most 7 mm. high. . . . *c.*

c. Cauline leaves 15–28, very crowded (except in old and "drawn" plants); the upper 7–20 with twisted scarious linear-lanceolate to linear-acicular tips 2–3 mm. long: taller flowering stems up to 4 (very rarely to 6) cm. high: involucre conspicuously imbricated, with 3–4 very unequal series of bracts. .2. *A. columnaris.*

c. Cauline leaves 4–16; the upper 1–7 with scarious tips; taller flowering stems mostly 4–18 cm. high (only exceptionally and when very young less than 4 cm.): involucre with the bracts subequal or in 2 or 3 unequal series, with 4–6 series in no. 10, which has but 8–10 remote cauline leaves (only the upper 3–5 appendaged) . . . . *d.*

d. Involucres deep-brown to blackish; the bracts subequal or in 2–3 unequal series. . . . *e.*

e. Involucres with the lower half prolonged, green and viscid, with the bracts closely and firmly appressed or agglutinated to form an ellipsoid-campanulate falsely gamophyllous cup, 7–9 mm. high: corollas 5–5.5 mm. long. . . . . .3. *A. Foggii.*

e. Involucres with loose and distinct bracts: corollas 3–5 mm. long. . . . *f.*

f. Bracts conspicuously unequal, in 3 series; the outer about half as long as the inner: corollas 4–5 mm. long. . . . *g.*

g. Cauline leaves 6–9; the 2–3 upper with a somewhat unguiculate lance-subulate tip 0.6–1.5 mm. long: involucre 6–7 mm. high, with 20–25 bracts; the outer and median series with scarious tips 1.2–2 mm. broad: corollas 4–4.8 mm. long: style included or barely exserted, entire or subentire: achenes 1.1–1.4 mm. long, papillate. . . . . .4. *A. Bayardi.*

g. Cauline leaves 8–14; the 4–5 upper with a narrowly oblong or lanceolate scarious tip 2–3.5 mm. long: involucre 7.5–9 mm. high, with 25–35 bracts; the outer and median with tips 2–2.5 mm. broad: corollas 4.8–5 mm. long: style exserted, bifid: achenes 1.8 mm. long, glabrous. . . . . .5. *A. brunnescens.*

f. Bracts subequal, in 2–3 series; the outer nearly as long as the inner. . . . *h.*

h. Flowering stems at most 1.2 dm. high, with 5–8 leaves; the 3–6 upper leaves with flag-like oblong-lanceolate flat tips. . . . *i.*

i. Involucres 7–10 mm. high, with squarrose pale-brown bract-tips 1.3–2 mm. broad: the upper 3–4 cauline leaves with scarious tips: corollas 4–4.5 mm. long: achenes 1.2–1.4 mm. long . . . . 6. *A. cana.*

i. Involucres 6–7 mm. high, with ascending fulvous bract-tips rarely more than 1 mm. broad: the upper 4–6 cauline leaves with scarious tips: corollas 3–4 mm. long: achenes 1.6–1.8 mm. long . . . . 7. *A. vexillifera.*

h. Flowering stems slender, up to 18 cm. high, with the 8–15 leaves mostly subulate-tipped; only the uppermost with lance- or linear-involute scarious tips: involucres 5–6 mm. high; the outer and median bracts with oblong-linear ascending tips 1–1.7 mm. broad: corollas 3–3.8 mm. long . . . . 8. *A. confusa.*

d. Involucres milk-white or ochroleucous to pale-brown . . . . *j.*

j. Cauline leaves 9–15: involucres milk-white or ochroleucous, 4.5–6 mm. high, with 2–3 series of subequal bracts: corollas 3–3.3 mm. long . . . . 9. *A. albicans.*

j. Cauline leaves 8–10: involucres stramineous or pale-brown, 5.5–7 mm. high, with 4–6 series of conspicuously unequal bracts: corollas 3.7–4.2 mm. long . . . . 10. *A. straminea.*

b. Larger basal leaves 2–17 mm. broad, distinctly mucronate or apiculate, green and glabrous to white-tomentose above: flowering stems 0.4–4 dm. high: involucres whitish, greenish or pale-brown, or rarely fulvous, (6–) 7–10 mm. high . . . . *k.*

k. The (2–) 3–6 upper cauline leaves with flat or flattish scarious tips: rosette-leaves only 2–10 mm. broad, gradually narrowed to base, scarcely petioled, with terminal mucro only 0.2–0.5 mm. long . . . . *l.*

l. Basal leaves bright-green and glabrous or promptly glabrate above, spatulate to cuneate-oblanceolate or narrowly cuneate-obovate, rounded at tip; cauline leaves normally 4–9: denuded old receptacles very low, much broader than high . . . . *m.*

m. Stolons and basal offshoots crowded, not elongate: basal leaves 6–15 mm. long, 2–4 mm. broad: flowering stem up to 1.5 dm. high: involucres 6–8 mm. high, brown: corollas 4.5 mm. long: achenes 1.2 mm. long, glabrous . . . . 11. *A. Wiegandii.*

m. Stolons elongate and slender, somewhat cord-like below the terminal rosettes: basal leaves 8–25 mm. long, 3–10 mm. broad: flowering stems up to 2.5 dm. high: involucres 7–10 mm. high; the bracts with white or whitish petaloid tips: corollas 5.5–6 mm. long: achenes 1.4–1.8 mm. long, papillate . . . . 12. *A. spathulata.*

l. Basal leaves white-tomentose above, 2–5 mm. broad, oblanceolate or narrowly obovate, acute or subacute; the cauline 8–14: denuded old receptacles elongate, as high as or higher than broad: involucres white or whitish, 7–9 mm. high: achenes papillate . . . . 13. *A. gaspensis.*

k. The upper cauline leaves with subulate-aristate tips (only the very uppermost, about the corymb, with tips

flattened): rosette-leaves broadly oblanceolate to broadly obovate; the larger 1–5 cm. long, 2–17 mm. broad: corolla and style together 4.8–7 mm. long . . . . *n.*

n. Stolons and basal offshoots rather short and assurgent (decumbent, with ascending tips): rosette-leaves oblanceolate to broadly obovate; the larger 1–5 cm. long, 2–17 mm. broad: corolla and style together 4.8–5.8 (–6.2 in *A. neodioica* var. *grandis*, unknown in Nfld.) mm. long. . . . *o.*

o. Rosette-leaves oblanceolate to narrowly spathulate-obovate, acute or subacute, gradually tapering to base and scarcely petioled, more or less grayish-tomentose above: flowering stems stiffly erect: cauline leaves 8–18, subapproximate or almost evenly spaced; the tips and bases of successive ones rarely becoming more than 1–4 cm. apart: corymbs compact (except in obviously aberrant individuals), 1–4 cm. broad; the heads subsessile or on rays up to 1 (very rarely to 2.5) cm. long: involucre greenish or light-brown only at base, otherwise lemon-white to milk-white or whitish-brown; its firm chartaceous blunt outer bracts mostly 1.4–2 mm. broad: denuded ripe receptacle shallowly and finely pitted; the pits narrower than the intermediate blunt ridges. . . . . 14. *A. rupicola.*

o. Rosette-leaves narrowly to broadly obovate, mostly rounded at summit and abruptly tapering to a petiole, gray-tomentose to green and glabrous above: flowering stems slender, often becoming somewhat flexuous upon elongation: cauline leaves 6–10(–14); the upper, by prolongation of the mature flowering stem, usually becoming very remote (often 3–14 cm. apart): corymbs commonly loose, up to 3–6 cm. broad, with many elongate rays (mostly 1–3 or 4, frequently to 6–10, cm. long): involucres greenish-, purplish-, or brown-tinged, with paler bract-tips: the thin and usually scarious bracts mostly 0.7–1.4 mm. broad: denuded ripe receptacle deeply and coarsely honeycomb-pitted; the pits broader than the thin intermediate walls. . . . . 15. *A. neodioica.*

n. Stolons procumbent or repent (lying flat) and elongated or somewhat cord-like below the leafy tips: rosette-leaves oblanceolate, acute; the principal ones 3–6.5 cm. long, 7–17 mm. broad: corolla and style together 6.3–7 mm. long. . 16. *A. petaloidea* var. *subcorymbosa.*

1. A. eucosma Fernald & Wiegand, Rhodora, xiii. 23 (1911).—Turfy limestone barrens and slopes from Pistolet Bay westward to Four-Mile Cove, Straits of Belle Isle; region of Port au Port Bay and Bay St. George. The following specimens are at hand: Burnt Cape, Pistolet Bay, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss*, no. 29,144; Schooner (or Brandy) Island, Pistolet Bay, *Pease & Long*, no. 29,147; Cook Point, Pistolet Bay, *Fernald & Gilbert*, no. 29,145; *Fernald, Gilbert & Hotchkiss*, no. 29,144; Cape Norman, *Wiegand, Griscom & Hotchkiss*, no. 29,146, *Wiegand & Long*, no.

29,152; Boat Harbor, Straits of Belle Isle, *Fernald, Wiegand & Long*, no. 29,148; Big Brook, Straits of Belle Isle, *Fernald & Long*, no. 29,140, *Wiegand, Gilbert & Hotchkiss*, nos. 29,141, 29,142, *Pease & Griscom*, no. 29,143; Half-way Brooks, Straits of Belle Isle, *Pease, Griscom, Gilbert & Hotchkiss*, no. 29,149; Four-Mile Cove, Straits of Belle Isle, *Fernald, Wiegand & Long*, no. 29,150; Table Mountain, Port au Port Bay, *Fernald, Wiegand & Kittredge*, no. 4144 (TYPE), *Fernald & St. John*, no. 10,868, *Mackenzie & Griscom*, no. 10,466; Green Gardens, Cape St. George, *Mackenzie & Griscom*, no. 11,051. Species endemic in Newfoundland.

Whether the broad gap in the known range of *A. eucosma* (between the eastern Straits of Belle Isle at the northeast and Port au Port Bay at the southwest) represents the actual absence of the species from that extensive area seems highly improbable. Many species, originally described from Table Mountain, Port au Port, or from Cape St. George, and subsequently seen on the Straits of Belle Isle, were found by us on the intermediate limestones centering on Pointe Riche (such plants as *Erigeron hyssopifolius* var. *villicaulis* Fernald, *Antennaria albicans* Fernald and *Arnica terrae-novae* Fern.).

The plant of Anticosti, mentioned at the time *A. eucosma* was published as "apparently referable to this species, but the material . . . inadequate for final determination," has been subsequently collected at numerous stations by Bro. Victorin and his associates. It proves to be *A. pulcherrima* (Hook.) Greene.

2. ANTENNARIA **columnaris**, sp. nov. (TAB. 263), humifusa, caulibus repentibus stragula densa 2–10 cm. diametro formantibus; stolonibus foliosis confertis ad 2 cm. longis; foliis basilaribus oblanceolatis vel anguste obovatis vix petiolatis 5–9 mm. longis 1.5–4 mm. latis vix vel brevissime mucronulatis albido-tomentosis, tomento coactili; caule florifero 0.5–4 (deinde rarissime –6) cm. alto; foliis caulinis 15–28 confertis vel superioribus deinde subdistantibus linearibus erectis, imis obtusis, mediis attenuatis mucronatis 0.7–2 cm. longis 1–2 mm. latis dorso strigosis, superioribus 7–20 apice scarioso lineari-lanceolato vel lineari-aciculari torto 2–3 mm. longo munitis; capitulis femineis 1–6 corymbosis subcylindricis (in statu exsiccato turbinato-campanulato); involucro 5.5–8.5 mm. alto basi lanato; bracteis 30–50 3–4-seriatis valde imbricatis, exterioribus lineari-oblongis obtusis vel subacutis fulvescentibus, interioribus angustioribus acuminatis plerumque fuscis erosis; corolla 4 mm. longo apice purpurascente; stylo purpurascente exserto bifido; achaeniis laevibus 1.2 mm. longis.—NEWFOUNDLAND: dry peaty and turfy limestone barrens, Gargamelle Cove, July 20, 1929, *Fernald, Long & Fogg*, no. 2076 (TYPE in Gray Herb.); peaty and turfy limestone barrens, Pointe Riche, July 24, 1929, *Fernald, Long & Fogg*, no. 2077. See p. 54.

A. columnaris, in the great abundance of cauline leaves, which during anthesis give the flowering stems the appearance of broad columns or (in the lower stems) small barrels, is unique. In many characters it suggests dwarfed *A. confusa* (described below; see plate 268) but it has usually many more leaves and very many more of the upper leaves with scarious appendages, and, when well developed, its heads are decidedly larger and with more imbricated bracts. *A. columnaris* also strongly resembles *A. angustata* Greene of Baffin Island and northern Labrador, but that species has the narrower basal leaves prominently mucronate, the cauline leaves few and the upper ones with broad and flat appendages.

3. Antennaria **Foggii**, sp. nov. (tab. 264), humifusa, caulibus ramosissimis repentibus stragula 0.3–1.8 dm. diametro formantibus; stolonibus foliosis plus minusve confertis 1–3 cm. longis; foliis basilaribus cuneato-oblanceolatis vel anguste obovatis vix petiolatis 4–16 mm. longis 2–4 (–5) mm. latis apice rotundatis vel subacutis obsolete vel brevissime mucronulatis utrinque albido-tomentosis tomento coactili; caule florifero 4–13 cm. alto floccoso-tomentoso; foliis caulinis 8–16 subdistantibus floccoso-tomentosis, imis linearibus obtusis, mediis linearibus acutis 8–16 mm. longis 1–2.5 mm. latis apice subulatis, superioribus 4–7 (2–3 involucriformibus inclusis) apice scarioso lanceolato 1.5–4 mm. longo munitis; capitulis femineis 1–3 (–5) corymbosis ellipsoideo-campanulatis (in statu exsiccato late campanulatis); involucro 7–9 mm. alto basi viscido-lanato sub medio prolongato viridescente bracteis 30–40 viscidis obscuris valde adpressis vel agglutinatis involucri apice coroniformibus, bractiarum superiorum apicibus 3-seriatis rosulatis oblongis brunnescentibus vel fuscescentibus 1.5–2 mm. latis, interioribus erosis vel eroso-fimbriatis; corolla 5–5.5 mm. longa apice purpurascente; stylo purpurascente exserto bifido; achaeniis laevibus 1.7 mm. longis; planta mascula ignota.—Newfoundland, limestone barrens bordering St. John Bay and Ingornachoix Bay: peaty turf on limestone barrens northeast of Old Port au Choix, St. John Bay, July 21, 1929, *Fernald, Long & Fogg*, no. 2100 (type in Gray Herb.); dry gravelly limestone barrens back of Crow's Head, St. John Bay, July 23, 1929, *Fernald, Long & Fogg*, no. 2101; dry gravelly limestone barrens, Pointe Riche, between St. John Bay and Ingornachoix Bay, July 24, 1929, *Fernald, Long & Fogg*, no. 2102; dry gravelly limestone barrens, Eastern Point, St. John Bay, July 26, 1929, *Fernald, Long & Fogg*, no. 2103; dry peaty and turfy limestone barrens, Gargamelle Cove, Ingornachoix Bay, July 20, 1929, *Fernald, Long & Fogg*, no. 2099 (less characteristic, with larger leaves and usually more heads with slightly looser outer bracts than the other nos.). See p. 54.

Antennaria Foggii, with which it is a great pleasure to associate the

name of one of my former students and Mr. Long's and my stimulating, untiring and always companionable associate on two Newfoundland trips, John Milton Fogg, Jr., is unique among the species of eastern America in having the bracts of the viscid or glutinous green lower half of the involucre so closely coherent as to give the involucre (at least when fresh) an almost gamophyllous aspect. In its very large involucre, with broad, oblong bract-tips, *A. Foggii* is suggestive of *A. cana* Fernald, another Newfoundland endemic, and *A. pygmaea* Fernald, of northern Labrador and Baffin Island. In both those species, however, the outer bracts are looser. In *A. cana* the flowering stems are lower, with fewer leaves, the involucral bracts narrower and the corolla shorter; in *A. pygmaea* the mats are at most 5 cm. broad, the basal leaves narrowly oblanceolate, glabrous and mucronate; the upper cauline with a broad-lanceolate to deltoid tip, the 1 or 2 heads with regularly imbricated involucre and corollas only 4 mm. long.

4. ANTENNARIA **Bayardi** sp. nov. (TAB. 265), humifusa, caulibus repentibus stragula 0.3–1.3 dm. diametro formantibus; stolonibus foliosis ad 3.5 cm. longis; foliis basilaribus cuneato-obovatis subrhomboideis apice subacutis vix mucronatis 5–10 mm. longis 2–5 mm. latis albido-tomentosis, tomento minuto pannoso deinde sublucido; caule florifero gracile 0.3–1.5 dm. alto floccoso-tomentoso; foliis caulinis 6–9 remotis lineari-oblongis laxe tomentosis, imis obtusis, mediis 0.9–1.4 cm. longis 1.5–3 mm. latis subacutis breviter mucronatis, superioribus 2–3 apice lanceolato-subulato scarioso plus minusve unguiculato 0.6–1.5 mm. longo munitis; capitulis femineis (1–) 3–6 corymbosis subcylindrico-urceolatis (in statu exsiccato subturbinatis), pedunculis plus minusve inaequalibus; involucro 6–7 mm. alto basi lanato; bracteis 20–25 3-seriatis valde inaequalibus, anguste oblongis, exteriorum basi viridiscentibus vel obscure brunneis apicibus sordidis vel fulvis vel pallide fuscis 1.2–2 mm. latis, interioribus angustioribus acuminatis; corolla 4–4.8 mm. longa apice purpurascente vel pallida; stylo incluso vel vix exserto integro vel subintegro; achaeniis 1.1–1.4 mm. longis hirtellis; planta mascula ignota.—NEWFOUNDLAND: dry humus over limestone ledges and shingle, Hannah's Head, Lower Humber Valley, July 12, 1929, *Fernald, Long & Fogg*, no. 2095; shelves of limestone cliff, Druid's (or Raglan) Head, Middle Arm, Bay of Islands, July 16, 1929, *Fernald, Long & Fogg*, no. 2096; limestone cliffs and talus, Tucker's Head, Main Arm, Bonne Bay, August 12, 1929, *Fernald, Long & Fogg*, no. 2097 (TYPE in Gray Herb.). See pp. 48, 83.

A. Bayardi, one of the most distinctive species of eastern North America, is named in appreciation of the loyal companionship and

keen instinct for the finer details of accurate botanical exploration of my companion on many Newfoundland cliffs and barrens, Bayard Long.

A. Bayardi is not closely related to any other small-leaved species of Newfoundland. In its hirtellous achenes it is almost unique, in this character agreeing with *A. isolepis* Greene of the northern half of the Labrador Peninsula and *A. subviscosa* Fernald of Rimouski and Gaspé Counties, Quebec. From both these it is quickly distinguished by its short and broad rosette-leaves; from *A. isolepis* by the blunt tips of the rosette-leaves, the short-mucronate tips of the median cauline and the delicate subulus of the upper cauline leaves (the rosette-leaves of *A. isolepis* being distinctly mucronate, and all but the lowermost cauline bearing broad flat appendages); from *A. subviscosa* by the closer tomentum of the rosette-leaves, shorter, broader and blunter cauline leaves, essential lack of glandularity and dark involucres (*A. subviscosa* having the basal leaves loosely tomentose, the median and upper cauline linear-attenuate and glandular-hirsute, and the glandular-viscid involucres cream-colored or buff to rose-tinged). *A. Bayardi* is also closely related to *A. intermedia* (Rosenv.) Porsild, of western Greenland, and *A. umbrinella* Rydb., of the Rocky Mountains. Both these species, however, have the pubescence of the basal leaves looser, the corymbs more symmetrical, the scarious tips of the involucral bracts broader and more rounded, and the achenes quite glabrous; furthermore the basal leaves of *A. intermedia* are much narrower and sharper-pointed.

All of these localized endemics (*A. intermedia* of nunataks of western Greenland, *A. isolepis* of the unglaciated area of northern Labrador, *A. Bayardi* of the unglaciated mountains of western Newfoundland, *A. subviscosa* of vertical nunatak-cliffs of Rimouski and Gaspé Counties, Quebec, and *A. umbrinella* of the Rocky Mts.) are obviously closely related; and they all have the simple to but slightly cleft style included or barely exserted, the other dwarf species of Newfoundland having the style definitely exserted and finally deeply cleft.

In publishing *A. umbrinella*, Rydberg said: "I describe this species as new, with some hesitation, not that I have any doubt concerning its distinctness from *A. alpina* and our North American species, but it is so closely similar to *A. Magellanica* Sch. Bip. that if it were not for the great distance between their ranges and for the slightly longer leaves and more slender caudex of the latter, I would regard the two

as one species,"[1] *A. magellanica* Sch. Bip. Flora, xxxviii. 117 (1855), with "achaeniis . . . sparse hirtis," was based upon Lechler's no. 1049a from "Sandy Point" (Punta Arenas) on the Straits of Magellan and an excellent sheet in the Gray Herbarium of this type-collection is well matched by a later collection from the Straits of Magellan by Cunningham. In publishing *A. magellanica*, Schultz Bipontinus suggested that it was very close to *A. chilensis* Remy. *A. chilensis* Remy in C. Gay, Fl. Chil. iv. 235 (1849) was from an undesignated province, presumably from the Straits. A beautiful sheet in the Gray Herbarium of this original collection of *A. chilensis*, showing 4 plants with 6 flowering stems in full anthesis, indicates that *A. magellanica* (1855) should be united with *A. chilensis* (1849). Although very similar to several North American plants, *A. chilensis* is not well matched by any of them. It has narrowly spatulate basal leaves 1–2 cm. long, 2.5–4 mm. wide, rounded at apex or obtuse and densely lanate above; the 7–9 linear or linear-oblanceolate cauline leaves 1.5–2 mm. broad, quite lanate and mucronate; the corymbs glomeruliform; the involucres only 5 mm. high, with very unequal creamy to slightly brownish, obtuse, oblong bracts in 3 series. *A. chilensis* is perhaps more nearly simulated by *A. straminea* Fernald, of Newfoundland, than by any other North American species. *A. straminea*, however, has shorter and broader basal leaves, with more pannose tomentum; narrower cauline leaves, the upper with dilated appendages; and even more imbricated involucres (of about 5 series).

The close relationship of the single endemic Patagonian species, *A. chilensis*, with the very extensive series of localized species of cordilleran North America, Greenland, northern Labrador, western Newfoundland and the Gaspé region is of peculiar significance in view of the relationships between these (or some of these) areas repeatedly pointed out in other groups: *Carex macloviana* D'Urv. of Chile, northwestern North America, Gaspé, Labrador, Greenland and arctic Europe, with very numerous endemic allies in cordilleran North America; *Empetrum rubrum* Vahl of subantarctic islands and the Andes of Chile, with its nearest allies two species centering on the Gulf of St. Lawrence;[2] *Primula decipiens* Duby (*P.* "*magellanica*") of the Falkland Islands and Patagonia, the only representative in the southern hemisphere of the complex boreal *Primula* § *Farinosae;*[3]

[1] Rydberg, Bull. Torr. Bot. Cl. xxiv. 302 (1897).

[2] See Fernald & Wiegand, Rhodora, xv. 213–217 (1913); Fernald, ibid, xxvi. 93 (1924); Fernald, Mem. Am. Acad. xv. 261, 262 (1925).

[3] See Fernald, Rhodora, xxx. 74–77 (1928).

Polystichum mohrioides (Bory) Presl of the subantarctic islands and Fuegia, with more or less separable geographic varieties in the Andes, in the cordilleran region of North America and on the Gaspé Peninsula;[1] and many other species, some with numerous localized boreal endemic allies, others, like *Carex capitata* L., *C. incurva* Lightf., *C. microglochin* Wahlenb., *Draba magellanica* Lam., *Plantago juncoides* Lam., etc., etc., with little if any recognized differentiation in the remote areas.

5. Antennaria **brunnescens**, sp. nov. (tab. 266), humifusa, caulibus ramosissimis repentibus stragula 0.3–1.8 dm. diametro formantibus; stolonibus foliosis ad 2 cm. longis; foliis basilaribus spathulatis vel anguste cuneato-obovatis apice brevissime mucronatis 5–14 mm. longis 2–4 mm. latis supra albidis, tomento denso minuto; caule florifero 5–14 cm. alto floccoso-tomentoso; foliis caulinis 8–14, subdistantibus linearibus strictis glabratis, imis obtusis, mediis 1–1.5 cm. longis 1–1.7 mm. latis acutis apice subulatis, superioribus 4–5 apice scarioso lanceolato vel anguste oblongo plano 2–3.5 mm. longo munitis; capitulis femineis 1–4 cylindrico-campanulatis (in statu exsiccato turbinatis) corymbosis; involucro 7.5–9 mm. alto basi lanato; bracteis 25–35 3-seriatis valde inaequalibus tenuibus oblongo-lanceolatis subacutis, exterioribus badiis 2–2.5 mm. latis) interioribus brunnescentibus lacerato-erosis; corolla 4.8–5 mm. longa apice purpurascente; stylo exserto bifido purpurascente; achaeniis 1.8 mm. longis glabris; planta mascula ignota.—Newfoundland: turfy limestone crest (alt. 650 m.) Killdevil, Main Arm of Bonne Bay, August 23, 1929, *Fernald, Long & Fogg*, no. 2105. See p. 89.

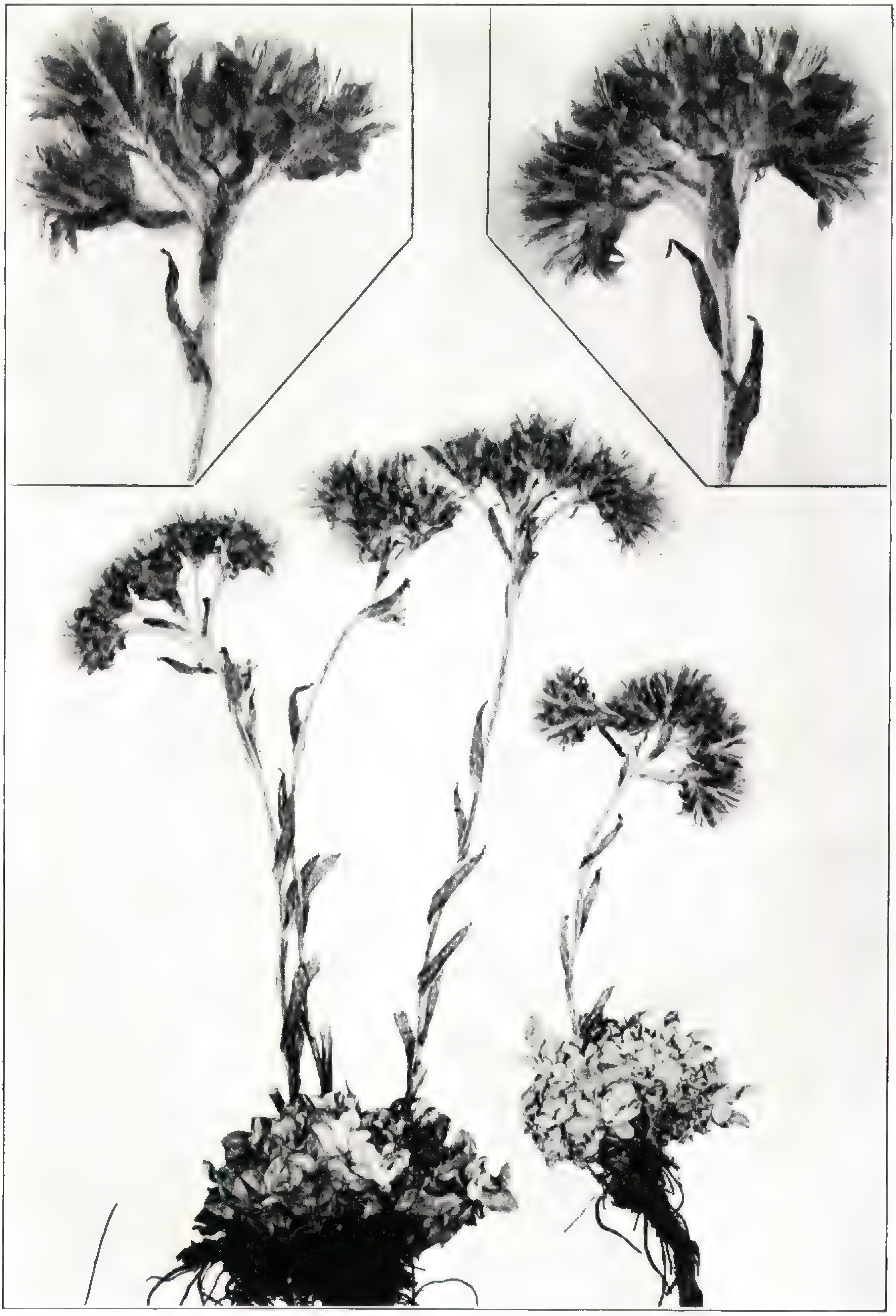
In its very large heads with strongly unequal series of bracts *A. brunnescens* resembles *A. borealis* Greene of Alaska and *A. fusca* Elias Nelson of the mountains of Wyoming. From them both it is at once distinguished by its acutish and brown rather than obtuse and lead-colored bracts and by its narrower cauline leaves with more slender appendages. In *A. fusca*, furthermore, the rosette-leaves are much broader, the cauline leaves much longer, and the corollas pale- instead of purple-tipped. In eastern North America the only small-leaved and dark-headed species which approaches *A. brunnescens* in size of involucre (7.5–9 mm. high), length of corolla (4.8–5 mm.) and length of achene (1.8 mm.) is *A. Foggii* described above; but the involucre of that species, with the bases of the subequal bracts green and agglutinated to simulate a gamophyllous cup, is wholly different from that of *A. brunnescens*, in which the short outer series is castaneous at base and quite free.

[1] See Fernald, Rhodora, xxvi. 89–93 (1924).

ANTENNARIA FOGGII, × 1; insert × 2.

Antennaria Bayardi, × 1; insert × 2.

Antennaria brunnescens, × 1; insert × 2.



Antennaria cana, × 1; inserts × 2.

6. A. CANA (Fernald & Wieg.) Fernald, RHODORA, xviii. 236 (1916), as to type-specimen (Pointe Riche, Newfoundland, *Fernald & Wiegand* no. 4139), not as to other specimens cited, and as to description only in part; Fernald, RHODORA, xxvi. 98, only in part and not including t. 142, fig. 3 (1924). *A. alpina*, var. *cana* Fernald & Wiegand, RHODORA, xiii. 24 (1911) as to type-specimen cited. PLATE 267.

Antennaria alpina, var. *cana* Fernald & Wiegand (1911) was a hopeless medley, published before the northern Antennarias of eastern America had begun to be properly studied. Its cited specimens belong to several species now clearly differentiated; but the TYPE from Pointe Riche (*Fernald & Wiegand*, no. 4139), having been definitely designated, must settle the final application of the name. When I elevated the variety to specific rank, restricting it to plants of western Newfoundland, I retained in it the two original Newfoundland elements: the TYPE, from Pointe Riche and the plant of Table Mountain, Port au Port Bay (*Fernald & Wiegand*, no. 4141), supplemented by later collections from the latter locality. Subsequent collections brought in much material like that from Table Mountain and gradually I came to think of and to recognize this plant as *A. cana* and under this name I have distributed much material. A much more local plant than the one I have generally been calling *A. cana* was collected along the Straits of Belle Isle in 1925 and, since it was so wholly distinct from that and all other recognized species of the genus, it was published as *A. Longii* Fernald, RHODORA, xxviii. 237 (1926). During the past summer both these plants were found in abundance on Pointe Riche and in its vicinity and I am chagrined to find that the Pointe Riche TYPE of *A. cana* is exactly *A. Longii* and not the much commoner plant (originally cited only from Table Mountain) which has been passing as *A. cana*.[1] *A. cana*, as now restricted, was accurately described as *A. Longii* Fernald, l. c. (1926). It is much more localized than the plant which has been confused with it. PLATE 267 shows characteristic material from the type locality of *A. cana* (at left) and also some of the type material of *A. Longii* (at right).

The material now at hand shows true A. CANA (*A. Longii*) from the following stations, all in northwestern Newfoundland: dry limestone gravel on barrens, Schooner (or Brandy) Island, Pistolet Bay, *Pease*

[1] This lamentable psychological error arose through the shortsighted practise followed in our first two seasons' work in Newfoundland, of labeling all material as collected by *Fernald & Wiegand*, regardless of whether both of us had been the actual collectors. I was at Blanc Sablon while Wiegand was at Pointe Riche, but we collected together on Table Mountain. Thus the Table Mountain plant long stood in my mind as *A. cana*, although the Pointe Riche plant had been designated as the type.

& Long, no. 29,177 (TYPE of *A. Longii*); Cape Norman, *Wiegand & Long*, nos. 29,180, 29,181; Boat Harbor, Straits of Belle Isle, *Fernald, Wiegand & Long*, no. 29,178; Four-Mile Cove, Straits of Belle Isle, *Fernald, Wiegand & Long*, no. 29,179; back of Crow's Head, St. John Bay, *Fernald, Long & Fogg*, no. 2086; Eastern Point, St. John Bay, *Fernald, Long & Fogg*, no. 2089; Pointe Riche, *Fernald & Wiegand*, no. 4139 (TYPE), *Fernald, Long & Fogg*, no. 2087; dry upper diorite rock-crests at about 750 m. alt., Lookout Mountain, Bonne Bay, *Fernald, Long & Fogg*, no. 2104 (material over-ripe, only doubtfully referred here). Species endemic in Newfoundland.[1]

The commoner plant which has erroneously passed as *A. cana* and which was illustrated as that species in Fernald, RHODORA, xxvi. t. 142, fig. 3, is described below as no. 8.

7. A. VEXILLIFERA Fernald, RHORORA, xxvi. 99, t. 142, fig. 4 (1924). —Local on dry gravelly limestone barrens, Pistolet Bay to St. John Bay: Cook Point, Pistolet Bay, *Fernald & Gilbert*, no. 29,171; Boat Harbor, Straits of Belle Isle, *Fernald, Wiegand & Long*, no. 29,172; Eastern Point, St. John Bay, *Fernald, Long & Fogg*, no. 2085. Otherwise known only from the Shickshock Mts. of the Gaspé Peninsula.

8. ANTENNARIA **confusa**, sp. nov. (TAB. 268, plant at left), humifusa, caulibus ramosissimis repentibus stragula 0.2–10 cm. diametro formantibus; stolonibus foliosis confertis perbrevibus (ad 2 cm. longis); foliis basilaribus oblanceolatis vel anguste cuneato-obovatis apice obtusis vel subacutis vix mucronatis 3–11 mm. longis 1–5 mm. latis supra albidis, tomento denso minuto; caule florifero 0.3–1.8 dm. alto floccoso-tomentoso; foliis caulinis 8–15 subapproximatis deinde subdistantibus linearibus, imis obtusis, mediis 8–15 mm. longis 1–2 mm. latis strictis acutis apice subulatis, superioribus 3–4 apice scarioso lanceolato- vel lineari-involuto 2–3 mm. longo munitis; capitulis femineis (1–)2–6 campanulatis corymbosis; involucro 5–6 mm. alto basi subviscido-lanato; bracteis 20–30, 2–3-seriatis subaequalibus tenuissimis, exterioribus anguste oblongis vel oblongo-linearibus obtusis 1–1.7 mm. latis fulvescentibus vel fuscescentibus, interioribus angustioribus acuminatis vel apiculatis erosis; corolla 3–3.8 mm. longa apice purpurascente; stylo purpurascente exserto bifido; achaeniis laevibus 1.5 mm. longis; planta mascula ignota.—NEWFOUNDLAND,

[1] Since the above went into type I have examined a specimen of *Antennaria cana*, collected at 5500 feet alt., Mt. Redfern Valley, northern British Columbia, August 2, 1932, by *Mrs. J. Norman Henry* (no. 309, Herb. Phil. Acad.). Mrs. Henry's material can be separated on no character evident in the single specimen from the smaller-headed individuals of *A. cana* of northwestern Newfoundland. This abundantly demonstrated relationship of the floras of western Newfoundland, the Mingan Islands, Anticosti and Gaspé and of the northern Rocky Mts. is further displayed by Mrs. Henry's discovery in northern British Columbia of *Lesquerella Purshii* (Wats.) Fern., a species heretofore known only from western Newfoundland and Anticosti (see p. 267 and t. 258); and by the finding by Dr. H. M. Raup on an adjacent mountain of northern British Columbia of *Agoseris gaspensis* Fern., previously known only from the Shickshock Mts.

in dry gravel or dry humus on limestone ledges and barrens, from Pistolet Bay to Port au Port Bay: Burnt Cape, Pistolet Bay, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss*, no. 29,157; Schooner (or Brandy) Island, Pistolet Bay, *Pease & Long*, no. 29,159; Cook Point, Pistolet Bay, *Fernald & Gilbert*, no. 29,160; Cape Norman, *Wiegand, Griscom & Hotchkiss*, no. 29,158; Boat Harbor, Straits of Belle, *Fernald, Wiegand & Long*, no. 29,162, Big Brook, Straits of Belle Isle, *Pease & Griscom*, no. 29,156; one mile back of Savage Cove, *Fernald & Long*, no. 29,155; Savage Point, Straits of Belle Isle, *Fernald, Wiegand, Pease, Long, Gilbert & Hotchkiss*, no. 29,154 (young, involucres blackish); Sandy (or Poverty) Cove, Straits of Belle Isle, *Fernald, Long & Gilbert*, no. 29,173; Rock Marsh, Flower Cove, *Fernald, Long & Dunbar*, no. 27,144; Brig Bay, *Fernald, Long & Dunbar* no. 27,145; limestone bluff opposite western escarpment of Bard Harbor Hill, *Fernald & Long*, no. 29,163; St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,169; back of Crow's Head, St. John Bay, *Fernald, Long & Fogg*, no. 2079; Old Port au Choix, *Fernald, Long & Fogg*, nos. 2078 (TYPE in Gray Herb.), 2082; Eastern Point, St. John Bay, *Fernald, Long & Fogg*, no. 2081; Pointe Riche, *Fernald, Long & Fogg*, no. 2080; Hannah's Head, lower Humber Valley, July 12, 1929, *Fernald, Long & Fogg*, no. 2090; tableland, alt. 200–300 m., Table Mountain, Port au Port Bay, *Fernald & Wiegand*, no. 4141 (included in original publication of *A. alpina*, var. *cana*), *Fernald & St. John* in Pl. Exsicc. Gray. no. 290, *Mackenzie & Griscom*, no. 10,467; all but the latest collections erroneously labeled *A. cana* (Fernald & Wiegand) Fernald.

As already pointed out, *A. confusa* is the comparatively common dark-headed dwarf *Antennaria* of the limestone barrens of western Newfoundland, until now passing erroneously as *A. cana*. This confusion arose through the fact that, before it was realized that there are many species of the group in western Newfoundland, the two were united; but since the TYPE of *A. cana* is, unfortunately, inseparable from the plant later called *A. Longii*, the name *A. cana* must be restricted to the latter species (t. 267). A somewhat diagramatic drawing of a small specimen of *A. confusa* was shown in Fernald, RHODORA, xxvi. t. 142, fig. 3, as *A. cana*. *A. confusa* is very quickly distinguished from true *A. cana* (*A. Longii*) by having the basal leaves mostly narrower and not rounded at summit; the flowering stems more slender, taller and more leafy (the stoutish stems of *A. cana* usually 2–5, rarely –9, cm. high and with only 4–8 leaves); the appendages of the upper leaves very slender-tipped (those of *A. cana* broader and blunt); the involucre only 5–6 mm. high (in *A. cana* 7–10 mm. high); and the corollas less than 4 mm. long (in *A. cana* 4–5 mm.).

In its slender habit, small heads and short corolla *A. confusa* is nearest *A. vexillifera* Fernald, Rhodora, xxvi. 99, t. 142, fig. 2 (1924), but that species has only 5–8 cauline leaves, nearly all of them with broad and flat oblong-lanceolate appendages, and larger heads with narrower bracts.

9. A. ALBICANS Fernald, Rhodora, xvi. 197 (1914) and xxvi. 100, t. 145, fig. 6 (1924).—Dry shingly, gravelly or turfy limestone barrens from Pistolet Bay to Port au Port Bay: Burnt Cape, Pistolet Bay, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss*, no. 29,164; Schooner (or Brandy) Island, Pistolet Bay, *Pease & Long*, no. 29,166; Cook Point, Pistolet Bay, *Fernald & Gilbert*, no. 29,165; Ice Point, St. Barbe Bay, *Wiegand, Gilbert & Hotchkiss*, no. 29,161; Eastern Point, St. John Bay, *Fernald, Long & Fogg*, no. 2083; Gargamelle Cove, Ingornachoix Bay, *Fernald, Long & Fogg*, no. 2084; Table Mountain, Port au Port Bay, *Fernald, & St. John*, no. 10,869 (TYPE). Endemic in Newfoundland.

10. A. STRAMINEA Fernald, Rhodora, xvi. 130 (1914) and xxvi. 100, t. 145, fig. 8 (1924).—Dry shingly, gravelly or peaty limestone barrens, Pistolet Bay to Bay St. George; turfy and rocky crests, Notre Dame Bay: Burnt Cape, Pistolet Bay, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss*, no. 29,168; Shoal Cove, Straits of Belle Isle, *Pease & Griscom*, no. 29,176; Savage Point, Straits of Belle Isle, *Fernald, Wiegand, Pease, Long, Gilbert & Hotchkiss*, no. 29,175; Ice Point, St. Barbe Bay, *Wiegand, Gilbert & Hotchkiss*, no. 29,167; Brig Bay, *Fernald, Long & Dunbar*, no. 27,187; St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,170; Old Port au Choix, *Fernald, Long & Fogg*, no. 2091; Pointe Riche, *Fernald & Wiegand*, no. 4140, *Fernald, Long & Fogg*, nos. 2092, 2093; limestone crest (alt. 650 m.), Killdevil, Main Arm, Bonne Bay, *Fernald, Long & Fogg*, no. 2094; Green Gardens, Cape St. George, *Mackenzie & Griscom*, no. 11,098; Twillingate, *Fernald, Wiegand & Bartram*, no. 6340 (TYPE); without definite locality, "Terre-neuve," 1828 (herb. Shuttleworth, Brit. Mus.). Endemic in Newfoundland.

11. A. WIEGANDII Fernald, Rhodora, xxviii. 238 (1926).—Very local, St. John Bay and Bay of Islands: turfy limestone barrens, St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,153 (TYPE); turfy and peaty knolls bordering limestone barrens, Eastern Point, St. John Bay, *Fernald, Long & Fogg*, no. 2098; trap ledges and gravel, subalpine southern slope of Lark Mountain, Bay of Islands, *Fernald, Long & Fogg*, no. 463 (distributed as *A. spathulata* "dwarfed subalpine form"). Endemic in Newfoundland. See p. 54.

12. A. SPATHULATA Fernald, Rhodora, xvi. 196 (1914) including var. *continentis* Fernald & St. John in St. John, Bot. Expl. No. Shore Gulf St. Lawr. 55 (1922). *A. canadensis*, var. *spathulata* Fernald, Rhodora, xvi. 132 (1914).—The most widely dispersed species of Newfoundland, occurring chiefly in turf or humus over calcareous or

noncalcareous ledges, shingle or gravel from Pistolet Bay to the Avalon Peninsula and to Bay St. George. The following specimens are before me: South Arm River, Holyrood, August 23, 1894, *Robinson & Schrenk;* Rushy Pond, Exploits Valley, *Fernald, Wiegand & Darlington,* no. 6362 (type); Burnt Cape, Pistolet Bay, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss,* nos. 29,182, 29,184; St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss,* no. 29,183; Pointe Riche, *Fernald & Wiegand,* no. 4143, *Fernald, Long & Fogg,* nos. 2109, 2110; Table Mountain, Port au Port Bay, *Fernald & St. John,* no. 10,870, *Mackenzie & Griscom,* no. 10,468; Cape St. George, *Mackenzie & Griscom,* no. 11,119. Known also from the mouth of the Natashquan, Sagnenay Co., Quebec, and from Anticosti Island. See p. 54.

13. ANTENNARIA **gaspensis** (Fernald), comb. nov. TAB. 268, plant at right. *A. neodioica,* var. *gaspensis* Fernald, Ottawa Nat. xix. 156 (1905).

When I published *A. neodioica,* var. *gaspensis* our understanding of the genus in eastern America was still very rudimentary, and certain characters now found to be very constant and of diagnostic value had not then been noted. My own field-experience with the plant was on the limestones of Percé in 1904 and 1905 and, although Victorin, Rolland, Brunel, Rousseau and others had repeatedly been collecting it at the tip of the Gaspé Peninsula and on Anticosti Island, I had not seen the plant growing since 1905 until 1929, when Messrs. Long, Fogg and I found it on the limestone headlands near the "bottom" (or head, as we should say) of the Middle Arm of Bay of Islands and on similar headlands on Bonne Bay. So very characteristic was the plant with its slenderly subcylindric whitish heads (in the dried condition turbinate) that it did not occur to any of us to associate it with *A. neodioica* Greene, in which the more or less green- or purple-tinged heads are more campanulate or subhemispherical (in the dried condition broadly rounded at base). The Newfoundland material proves to be quite like the type-collection of *A. neodioica,* var. *gaspensis,* and study in the herbarium reinforces our field-impression in Newfoundland that the plant is quite distinct from *A. neodioica.* Briefly the diagnostic characters are as follows:

A. GASPENSIS. Rosette-leaves oblanceolate or narrowly obovate, 2–5 mm. broad, strongly whitened above: the terminal mucro or subulus only 0.2–0.5 mm. long: subulus of the median cauline leaves prolonged and commonly unguiculate; tips of the 3–5 upper leaves with pale scarious linear-oblong appendages: fresh involucres slenderly cylindric, becoming turbinate in drying, of 25–35 linear-oblong whitish or light-brown bracts: denuded receptacle ovoid, as high as or higher than broad.

A. neodioica. Rosette-leaves broadly oblanceolate to broadly obovate, 2–17 mm. broad, with the green surface obvious through the grayish tomentum (or rarely glabrous); the terminal mucro or subulus 0.5–1 mm. long: subulus of the median cauline leaves usually straight; the upper leaves (except rarely at base of corymb) with slender and prolonged, often curved, subulate tips: fresh involucres campanulate to hemispherical, the dried broadly rounded at base, of 35–50 or more greenish- or purplish-tinged bracts: denuded receptacle a low rounded dome, distinctly broader than high.

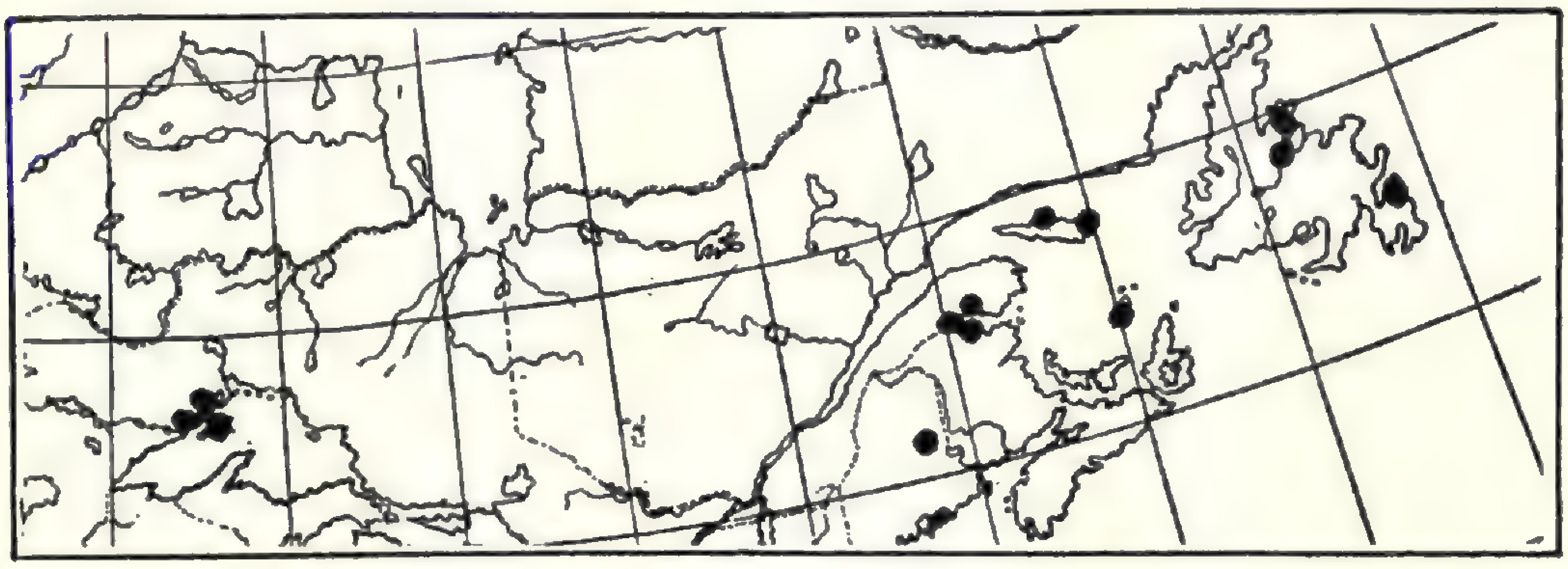
On account of its very narrow leaves much material of the narrowest-leaved extreme of *A. neodioica*, var. *attenuata* has been identified and often reported as *A. neodioica*, var. *gaspensis*. True *A. gaspensis*, as shown by the large series now collected, is confined to the limestones at the eastern end of the Gaspé Peninsula and to Anticosti Island and the limestone mountains of western Newfoundland.

The following collections are referred to A. gaspensis. Newfoundland: turf over limestone talus, Druid's (or Raglan) Head, Middle Arm, Bay of Islands, *Fernald, Long & Fogg*, no. 2106; turfy limestone ledges and talus, eastern dome of Penguin Head, Middle Arm, Bay of Islands, *Fernald, Long & Fogg*, no. 2107; limestone cliffs and talus, Tucker's Head, Main Arm, Bonne Bay, *Fernald, Long, & Fogg*, no. 2108. Quebec: talus calcaires, Rivière Vaureal, Anticosti, *Victorin, Rolland & Louis*, no. 21,327; sur les talus calcaires, Riv. à la Patate, Anticosti, *Victorin, Rolland & Louis*, no. 21,332; sur les talus secs aux bords de l'entrée, Riv. des Caps, Anticosti, *Victorin & Rolland*, no. 27,615; Jupiter River, Anticosti, *J. Macoun*, no. 70,448; platières de l'embouchure, Riv. Jupiter, Anticosti, *Victorin & Rolland*, nos. 25,377, 25,383; calcareous cliffs near Cape Rosier, *A. S. Pease*, no. 20,202; sur le rebord de la falaise, "La Vieille," Cap Gaspé, *Victorin, Germain, Brunel & Rousseau*, no. 17,548; turfy crest of sea cliffs, Cape Gaspé, *Pease*, no. 20,204; alluvions caillouteux côté sud du Forillon, au-delà de Grande-Grève, près de l'Anse-à-l'Andien, *Victorin, Rolland, Brunel & Rousseau*, no. 17,549; limestone shingle, Le Coulé, Percé, August 17, 1904, *Collins, Fernald & Pease;* gravelly slopes, Les Murailles, Percé, August 17, 1904, *Collins, Fernald & Pease;* dry calcareous gravel, Mt. Ste. Anne, Percé, August 18, 1904, *Collins, Fernald & Pease*, also *Collins, Fernald & Pease*, no. 142 (type in Gray Herb.), *Fernald* in Pl. Exsicc. Gray. no. 291, *Victorin, Rolland, Brunel & Rousseau*, no. 17,550. See pp. 51, 83.

14. A. rupicola Fernald, Rhodora, i. 74 (1899). *A. neodioica*, var. *rupicola* Fernald, Rhodora, xvi. 132 (1914).—In Newfoundland known only in the southeastern half of the island, from the Avalon Peninsula to Notre Dame Bay and the Exploits Valley: dry crests and rocky slopes of sandstone and arenaceous slate hills back of Carbonear, *Fernald & Wiegand*, no. 6349; dry cliffs and talus, Tilt Cove, *Fernald, Wiegand & Darlington*, no. 6347; sandstone ledges and talus, Grand

Falls, *Fernald, Wiegand, Bartram & Darlington*, nos. 6341–6348; no. 6345 aberrant in having stolons and supernumerary branches developed from the upper axils.

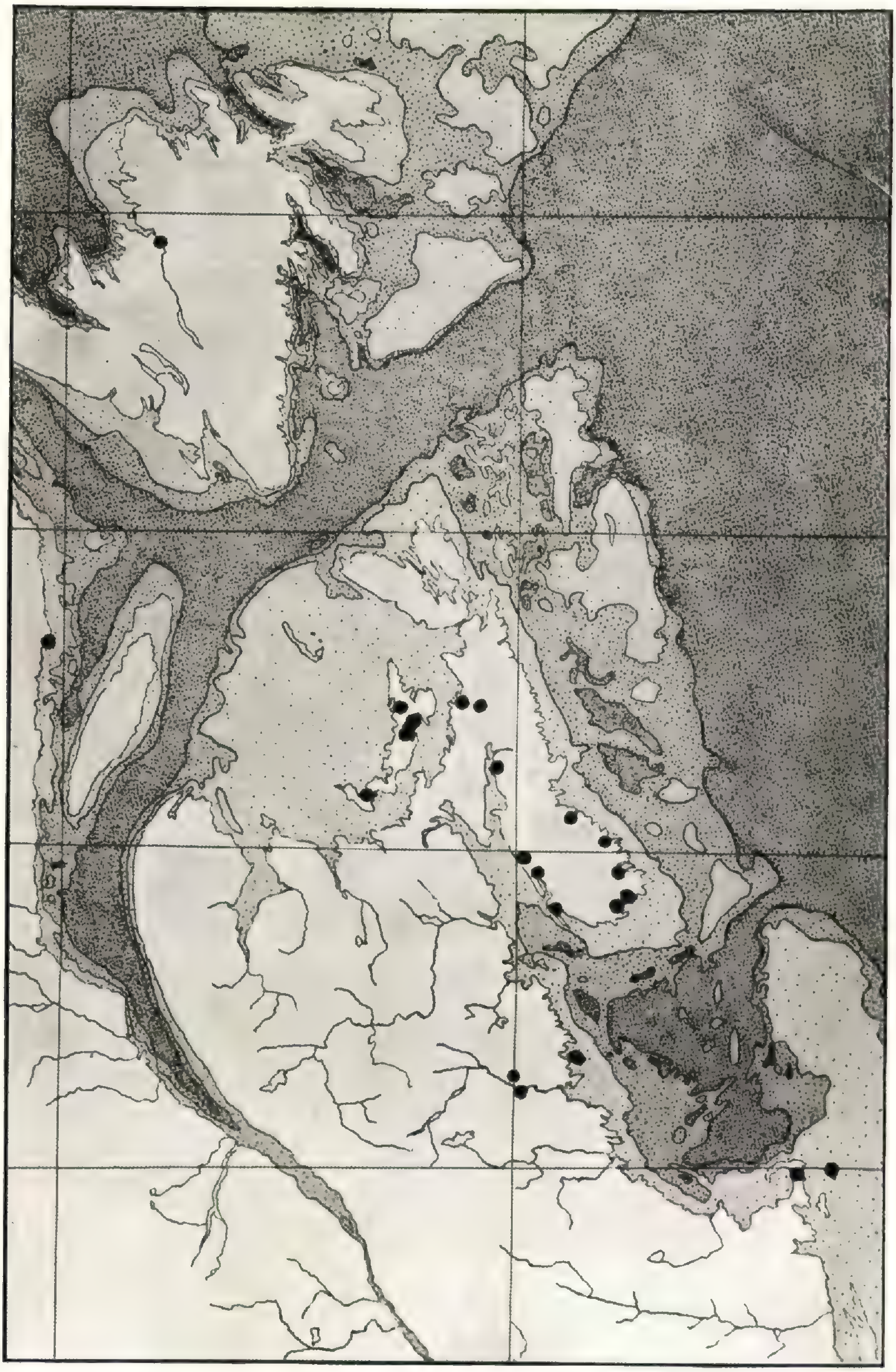
Antennaria rupicola, originally described from Aroostook Co., Maine, was reduced by me to varietal rank in 1914 on the basis of the variable series from along the Exploits at Grand Falls; but material of the plant gradually accumulated from a broad and natural range across southern Canada (MAP 26) is thoroughly consistent, and a re-



Map 26. Range of ANTENNARIA RUPICOLA.

study of it, with the finding of the additional character of the receptacle used in the key, convinces me that it is a well defined northern species.

A. rupicola (MAP 26) ranges from Newfoundland and Anticosti Island to northern Maine, and Thunder Bay District, Ontario. Besides the Newfoundland material (cited above), I have seen the following. QUEBEC: talus calcaires des bords de la Rivière Macdonald, Anticosti, *Victorin, Rolland & Louis*, no. 21,328; sur les cailloutis secs à l'entrée, Riv. Macdonald, *Victorin & Rolland*, no. 27,616; detritus calcaires des talus secs, Riv. du. Rénard, Anticosti, *Victorin & Rolland*, no. 27,614; wooded slope, St. Jean l'Evangéliste, Nouvelle, July 19 & 20, 1904, *Collins & Fernald;* ledgy banks of Restigouche River, Matapedia, July 19, 1904, *Collins & Fernald* (aberrant specimen bearing rosettes and supernumerary branches from the upper axils). MAGDALEN ISLANDS: dry clearing, Grindstone, Grindstone Island, *Fernald, Bartram, Long & St. John*, no. 8175 (distributed as *A. neodioica*). NEW BRUNSWICK: open field, Campbellton, July 8, 1878, *Chalmers* (herb. Brit. Mus.). MAINE: ledgy shores and rocky banks (calcareous-slate ledges), Island Falls, *Fernald*, no. 2361 (TYPE), *Fernald* in Pl. Exsicc. Gray, no. 37, *Pease*, no. 2251. ONTARIO: yellow clay soil along Onaman River, Thunder Bay Distr., 1912, *H. E. Pulling;* rocks, Port Arthur, *C. S. Williamson* (herb. Phil. Acad.). MICHIGAN: Isle Royale, *Cooper*, no. 50.



Map 27. Range of Antennaria petaloidea, var. subcorymbosa.

15. A. NEODIOICA Greene, Pittonia, iii. 184 (1897).—In Newfoundland three varieties may be recognized:[1]

a. Rosette-leaves gray-tomentose above....*b.*
b. Outer and middle bracts of pistillate heads obtuse.........Var. *typica.*
b. Outer and middle bracts attenuate..................Var. *attenuata.*
a. Rosette-leaves bright-green and glabrous above........Var. *chlorophylla.*

Var. **typica.** *A. neodioida* Greene, l. c.; Fernald, Proc. Bost. Soc. Nat. Hist, xxviii. 244 (1898); Robinson & Fernald in Gray, Man, ed. 7: 822, fig. 982 (1908).—In Newfoundland known only from the southeastern half of the Island: 10 miles south of St. John's, July, 1902, *L. L. Dame;* rocky soil, along Rennie's River, near St. John's, July 12, 1902, *Dame;* rocky clearing, St. John's, *Fernald & Wiegand,* no. 6357; Murray's Pond, 1928, *A. M. Ayre;* dry ledgy slope, Killigrew's, *Fernald & Wiegand,* no. 6358; rocky hills and gravel, ledges and talus along Exploits River, Grand Falls, *Fernald, Wiegand, Bartram & Darlington,* nos. 6359–6361; dry soil, Millertown, July 11, 1930, *Jansson;* rocky river-shore and dry woods, Buchan Junction, July, 1930, *Jansson.* A widely distributed species, from southern Newfoundland to Ontario, south to Virginia, Indiana and Wisconsin.

Var. ATTENUATA Fernald, Proc. Bost. Soc. Nat. Hist. xxviii. 248 (1898).—More general in range: Murrays Pond and Placentia, 1928, *A. M. Ayre;* sandy terraces of Exploits River, Bishop Falls, *Fernald, Wiegand & Darlington,* no. 6356; sandstone ledges and talus, Grand Falls, *Fernald, Wiegand, Bartram & Darlington,* nos. 6350–6355; turfy limestone crest (alt. 650 m.), Killdevil, Main Arm, Bonne Bay, *Fernald, Long & Fogg,* no. 2111; bare spots on peaty and gravelly slopes, French (or Tweed) Island, Bay of Islands, *Fernald, Long & Fogg,* no. 465; dry gravelly slope, Lark Harbor, Bay of Islands, *Fernald, Long & Fogg,* no. 464 (the last two erroneously distributed as var.

[1] Two other well marked varieties are as yet not known from Newfoundland:

Var. GRANDIS Fernald, RHODORA, i. 73 (1899). *A. grandis* House, Bull. N. Y. State Mus. no. 188: 60, 63 (1916), without statement of the specific characters. The largest extreme, with rosette-leaves 7–17 mm. broad; cauline leaves 7–14, mostly broader and longer than in the other vars.; bracts of the involucres (except in forms from deep shade) reddish below, white-petaloid above: corolla and style 5.5–6.2 mm. long.—Nova Scotia and southern New Brunswick to southern Quebec and Michigan, south to Massachusetts and New York.

Var. **interjecta,** var. nov., caulibus humifusis repentibus rigidis subligneis; foliis basilaribus rosulatis oblanceolatis vel anguste obovatis acutis vel subacutis basi subcuneatis supra griseis 3–7 mm. latis; caule florifero erecto vix flexuoso 0.5–2.5 dm. alto; foliis caulinis 8–14 subapproximatis vel vix distantibus; corymbis subglomerulatis globosis vel hemisphericis 1.5–3 cm. diametro; involucri bracteis scariosis linearibus vel lineari-lanceolatis attenuatis stramineis vel albido-virescentibus.—Gaspé and Rimouski Counties, QUEBEC: dry gravelly woods, banks of Grand River, Gaspé Co., June 30–July 3, 1904, *Fernald;* dry fir woods at base of limestone-conglomerate cliffs, west of Baptiste Michaud's, Bic, Rimouski Co., July 16, 1904, *Collins & Fernald* (TYPE in Gray Herb.); sandy field, Anse aux Bouleaux, Bic, *Fernald & Collins.* no. 777; newly seeded field, 1½ miles west of village, Bic, June 22, 1905, *F. F. Forbes;* dry hillside north of Bic, June 23, 1905, *Forbes;* dry bank by Anse Orignal, Bic, June 27, 1905, *Forbes;* sur les schistes dénudés, Pointe du Vieux Bic, *Rousseau,* nos. 26,454, 26,639; sur les schistes, Cap à l'Orignal, Bic, *Rousseau,* no. 26,706; sur les schistes dénudés. Ile du Bic, *Rousseau,* no. 26,848.

Var. *interjecta* has the habit of *A. rupicola,* and the narrow and scarcely petioled, acute rosette-leaves, the numerous and scarcely distant cauline leaves, and the dense subglomerulate corymb of that species; but its scarious involucral bracts are like those of *A. neodioica,* var. *attenuata* and its receptacles have the large and deep pits of *A. neodioica.*

gaspensis); dry exposed calcareous cliffs, Steady Brook Falls, lower Humber River, *Fernald & Wiegand*, no. 4142. The variety has a broad range similar to that of var. *typica*. See p. 89.

Var. CHLOROPHYLLA Fernald, Rhodora, xxiii. 296 (1922).—Local: rocky river-shore, Buchan Junction, *Jansson;* dry gravelly slope, Lark Harbor, Bay of Islands, *Fernald, Long & Fogg*, no. 462 (erroneously distributed as *A. spathulata*); St. George's, *Mackenzie & Griscom*, no. 11,142.

Var. *chlorophylla* ranges from western Newfoundland and Antocosti Island to Nova Scotia, New England and New York.

16. A. PETALOIDEA Fernald, var. SUBCORYMBOSA Fernald, Rhodora, xvi. 133 (1914). *A. neglecta*, var. *subcorymbosa* Fernald, Proc. Bost. Soc. Nat. Hist. xxviii. 246 (1898).—Very rare in Newfoundland: sandy terraces of Exploits River, Bishop Falls, *Fernald, Wiegand & Darlington*, no. 6363. A coastwise variety (MAP 27) of the more widely ranging *A. petaloidea*, occurring from east-central Newfoundland, the lower Natashquan (Saguenay Co., Quebec), Prince Edward Island and Nova Scotia to Nantucket Island and Cape Cod, Massachusetts.

*Helianthus giganteus L., var. subtuberosus (Bourgeau) Britton. A few plants with obvious weeds on a pastured slope, Lark Harbor, Bay of Islands, *Fernald, Long & Fogg*, no. 470.

This plant of the north central United States and adjacent Canada is becoming a frequent weed in the East.

Artemisia borealis Pall.

As pointed out in Rhodora, xxix. 93 (1927) we have three varieties of *Artemesia borealis* in Newfoundland. They are, apparently, confined to the West Coast.

A. BOREALIS (typical). Bonne Bay: talus of limestone cliffs near Stanleyville, *Fernald, Long & Fogg*, no. 2121. Port au Port Bay: dry limestone barrens, Table Mt., *Fernald, Wiegand & Kittredge*, no. 4164.

A. BOREALIS, var. PURSHII Besser. St. John Bay: dry gravelly limestone barrens, St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,203. Port au Port Bay: dry exposed ledges and shingle on the limestone tableland, Table Mt., *Fernald & St. John*, no. 10,871, *Mackenzie & Griscom*, no. 10,476. Cape St. George: limestone barrens, Green Gardens, *Mackenzie & Griscom*, no. 11,079.

A. BOREALIS, var. LATISECTA Fern. l. c. (1927). Bonne Bay: shelves and talus of diorite cliffs, Western Head, *Fernald, Long & Fogg*, no. 2122. Bay of Islands: talus of sea-cliffs, French (or Tweed) Island, *Fernald, Long & Fogg*, no. 476 (TYPE); turfy spots on slaty calcareous talus, Cutwater Head, no. 2120. See p. 7.

(*To be continued.*)

On the Distribution of Sorocarpus.—In Rhodora, Vol. I., p. 127, July, 1899 Frank S. Collins reported that Miss Colt had collected *Sorocarpus uvaeformis* (Lyngb.) Pringsh. along the coast of Marthas Vineyard. Probably referring to this collection, he also recorded its occurrence in Southern Massachusetts in his list of New England Marine Algae which appears in Rhodora, Vol. II., pp. 41–52, February, 1900. More than thirty years ago I collected it sparingly in Vineyard Sound and in Narragansett Bay. It occurs also in the North Sea at Helgoland and at several stations in the Baltic. According to De Toni, Sylloge, Vol. III., p. 569, Hariot found it along the Miquelon Islands off Newfoundland. But despite this wide distribution it is exceedingly scarce everywhere, and only a few filaments will be found intermingled with *Ectocarpus confervoides* or *E. siliculosus*. It is therefore with decided pleasure that I record its collection along an exposed shore at North Brooklin, Maine, on May 16, 1933. It should be sought in late winter or early spring, as it is an annual and seems to disappear when its fruiting season has passed.

It is said to vary much in size. The specimens I saw from Southern New England were rather small and slender; and, if memory serves me correctly, seemed to trend toward the variety *balticus* of Reinke. The specimen from Maine is darker and more robust, reaching the height of about three inches.

Slides will be deposited in the Farlow Herbarium and the National Herbarium.—R. E. Schuh, Brooklin, Maine.

Notes on Rocky Mountain Plants.

Atragene columbiana Nutt., f. **albescens** f. nov. formae typicae similis sed sepalis albis.—Colorado: Rocky Mountain National Park, Fall River, near Cascade Lodge, alt. 8,300 ft., June 16, 1933. *E. H. & L. Kelso* 40 (type, in my collection).

Sepals pure white, otherwise similar to the species.

Clematis occidentalis var. *albiflora* Cockerell, Bot. Gaz. 29: 281. 1900, is a form of *Atragene pseudoalpina* (Kuntze) Rydb.

Eriogonum annuum Nutt., f. **roseum** f. nov. Sepala laete rosea.—Colorado: Aurora, plains 2 miles north, September 18, 1929. *L. Kelso* 1316 (type, in my collection).

With the species; sepals bright pink.

Many specimens of this form were seen and collected. The bright roseate color does not fade to the brownish tint often seen on herbarium specimens.

Leucocrinum montanum Nutt., var. **fibrosum**, var. nov. Formae typicae similis sed radix cum fibris crispis conspicuis.—Nevada: "form" near Oreana, Humboldt Valley, alt. 4,500 ft. June, 1868. *S. Watson* 1177; Winnemucca, May 17, 1917, *Wooton;* Paradise Valley, Humboldt Co., Apr. 30, 1905, *P. B. Kennedy* 1047 (type, in U. S. National Herbarium).

Leaves more firm, strongly persistent on the rootstock as a mass of curled fibers; otherwise similar to the species.

Many young and old plants growing around Denver, Colorado, as well as material from other states show few or no fibers remaining from dead leaves. If present they are not strongly attached.—E. H. Kelso, Washington, D. C.

HETEROCHROMISM IN ARCTOSTAPHYLOS UVA-URSI, VAR. COACTILIS[1]

M. L. Fernald

On October 9th, 1932, I had a group of students on the annual field-trip of "Botany 7" to Cape Cod. Visiting the eastern "forearm" of the Cape to show them the great boulderless downs carpeted with *Corema Conradii* Torr. and a fine assemblage of *Hudsonia* (*H. ericoides* L., *H. tomentosa* Nutt. and the somewhat intermediate but more northern *H. tomentosa*, var. *intermedia* Peck) interspersed with the characteristic broad carpets of *Arctostaphylos Uva-ursi*, var. *coactilis* Fern. & Macbr. Rhodora, xvi. 212 (1914), I decided to extend the trip into the northeastern corner of Wellfleet, in order to exhibit the well-known station[2] there of *Opuntia humifusa* Raf. (*O. vulgaris* of Gray's Man. not Mill.).

Walking through the dry pitch pine woods, one of the students, Mr. George B. Rossbach, picked a flowering sprig from the Bearberry, with vivid carmine to purple slender flowers. I had grown hardened to the discovery of unusual plants on the Cape, but when further search showed that many of the carpets of *Arctostaphylos* in this part of Wellfleet were bearing abundant October inflorescences of these bright red slenderly barrel-shaped or subcylindric flowers, the amazement of the entire party can be imagined. On October 13, I returned with Mr. Charles Bullard and my son, Henry G. Fernald, to Wellfleet and collected for the *Plantae Exsiccatae Grayanae* 110 sheets of flowering material, and still later, at the end of the month, visiting Wellfleet with a class of Radcliffe students, we found the

[1] Published with aid to Rhodora from the National Academy of Sciences.

[2] See F. S. Collins, Rhodora, xvi. 102 (1914).

carmine or "Pomegranate purple" or "Bordeaux" (of Ridgeway) flowers still abundant in the woods and in half-shade. On the open sands the red autumnal flowers were shriveled but in the woods and their openings they were apparently going to linger until winter.

On the trip with Mr. Bullard and my son we found a few (but very few) whitish or pale-pink urceolate and comparatively short flowers such as abound in April and May. These were on plants which bore in abundance the slender and longer red or purple flowers and sometimes the two colors and forms were found in a single inflorescence. This anomalous situation clearly disposed of any temptation to treat the novel autumn-flowering plants as a new species; it was evident that we were dealing with heterochromism in individual plants. On October 13th, Mr. Bullard, my son and I traced the red-flowered colonies southward at least to Eastham. South and west of there (on the central Cape and in Plymouth) we found no such flowers, nor were they seen in the many colonies of *Arctostaphylos* in northeastern Massachusetts.

On May 9, 1933, returning to the marked colony at Wellfleet, where in mid-October we had secured more than 100 sheets of red-flowering specimens, my son and I found the same carpets heavily loaded with the ordinary vernal broadly urceolate white to pale-pink flowers. So abundant were these as to whiten the patches, but interspersed with the abundant white to pale-pink inflorescences there were few and scattered vivid red ones quite like those of the late autumn but smaller, the slenderly subcylindric corollas strongly contrasting in size and shape, as well as color, with the abundant pale vernal flowers.

We hoped that the two colors were on separate plants and for a time this seemed to be the case, but soon we found the two strongly contrasted colors on identical branches and in some cases mixed in single inflorescences, while very rarely the red flowers approached in size and shape the urceolate whitish ones. On this trip we stopped midway in the township of Yarmouth (about 1 mile south of Bass River station) and the first patch of *Arctostaphylos* we looked at had one red inflorescence among the abundant whitish ones, but search revealed very few others.

Stopping on our return to Cambridge, at the Arnold Arboretum, we showed the spring collection to Mr. Alfred Rehder. His first response, on seeing only the slender red corollas, was the inevitable one, "surely a new species"; but upon seeing the plants with both

types of flowers his astonishment was as great as my own had been. Living branches were left with Mr. Rehder for cultivation at the Arnold Arboretum; others have been given to Miss Louisa Hunnewell; another has been placed in a bed of sand from the original station where I can personally watch it and we should know in another season whether these plants from Wellfleet regularly produce two types of inflorescences.

Dissection of flowers from the two types shows no structural differences: the anthers, stigmas and ovaries seem identical; but as yet we have no indication whether the two are equally fertile. As already stated, the red flowers, when fresh, commonly match the carmine or the "Pomegranate purple" of Ridgeway, but many of them are deeper or darker in color, approximately the "Bordeaux" of Ridgeway. Mrs. C. A. Weatherby most kindly made a water-color sketch of fresh carmine flowers now preserved at the Gray Herbarium; and my son has made color-plates by photography to preserve the original colors of the more purple tones. In drying the red or purple flowers tend to darken.

From our present knowledge the form of *Arctostaphylos Uva-ursi*, var. *coactilis* with abundant autumnal red or deep-purple flowers is apparently common on outer or "Lower" Cape Cod, especially in Wellfleet, becoming scarce westward, at least to Yarmouth; but on the "Upper Cape" it is unknown and it has not been found on the mainland of Massachusetts. Whether it is actually restricted to Cape Cod or whether it is of wider occurrence can be determined only by autumnal observation of colonies elsewhere in the range of var. *coactilis*. As a highly notable form this plant may be called

Arctostaphylos Uva-ursi (L.) Spreng., var. coactilis Fern. & Macbr., forma **heterochroma**, f. nov., formae typicae simillima differt corollis florum autumnalium saepe carmino-rubris vel purpureis subcylindricis gracilibus et corollis florum vernalium plerisque albis vel pallide roseis urceolatis rariter rubro-purpureis elongatisque.—Massachusetts: abundant in open sandy woods, Wellfleet, October 9, 1932, *G. B. Rossbach, M. L. Fernald et al.* (type in Gray Herb.), Oct. 13, 1932, *M. L. Fernald, Chas. Bullard & H. G. Fernald* in Pl. Exsicc. Gray., May 9, 1933, *M. L. & H. G. Fernald;* dry sandy pine woods, North Eastham, October 13, 1932, *Fernald, Bullard & Fernald;* dry sandy pine woods, Yarmouth, May 9, 1933, *Fernald & Fernald.*

Gray Herbarium.

Volume 35, no. 417, including pages 295–322 and 2 plates, was issued 26 August, 1933.

ANTENNARIA CONFUSA (left), × 1; A. GASPENSIS (right), × 1; inserts × 2.

DUPLICATE BOOKS FOR SALE

Darby, J. Botany of the Southern States. New York. 1855. Half roan, shelf-worn. . . . . **$ 2.00**

Emerson, G. B. Report on the Trees and Shrubs growing naturally in the Forests of Massachusetts. Ed. 3, 2 vols. With plain plates. Boston. 1878. Cloth binding. . . . . **$ 5.00**

Rafinesque, C. S. Medical Flora; or, Manual of the medical botany of the United States of North America. Philadelphia. 1828–30. Cloth binding; one volume broken. Now rare **$12.00**

Sullivant, W. S. Icones Muscorum, 8 vo., illustrated by numerous copper plates of high excellence (unbound and in sheets). Here offered at a greatly reduced price . . . . **$ 6.00**
Supplement to the preceding available only in a few defective copies. Prices on request.

Address Librarian,

GRAY HERBARIUM of HARVARD UNIVERSITY,

Cambridge, Mass.

Early Volumes of Rhodora

A limited number of the earlier volumes can still be supplied. Libraries and other subscribers needing to complete their sets should communicate with LUDLOW GRISCOM, Museum of Comparative Zoology, Cambridge, Mass.

FIELD AND HERBARIUM EQUIPMENT

HAND LENSES	COLLECTING CASES	PLANT PRESSES
FERN TROWELS	MOUNTING PAPERS	GENUS COVERS
FIELD PICKS	HERBARIUM CASES	FELT DRIERS

Write for free Catalog R-91

CAMBRIDGE BOTANICAL SUPPLY CO.,

Waverly, Mass.

6 1933

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB

Conducted and published for the Club, by

MERRITT LYNDON FERNALD, Editor-in-Chief

JAMES FRANKLIN COLLINS
CHARLES ALFRED WEATHERBY } Associate Editors
LUDLOW GRISCOM

Vol. 35. November, 1933. No. 419.

CONTENTS:

Reports on the Flora of Massachusetts,—II.................. 351

Notes on the Flora of Columbia, Missouri. *Francis Drouet*..... 359

Recent Discoveries in the Newfoundland Flora (continued). *M. L. Fernald*.. 364

Aristida longespica in Connecticut. *C. A. Weatherby*.......... 386

The New England Botanical Club, Inc.

8 and 10 West King St., Lancaster, Pa.

Room 1001, 53 State St., Boston, Mass.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price, $2.00 per year, net, postpaid, in funds payable at par in United States currency in Boston; single copies (if available) 20 cents. Volumes 1–8 or some single numbers from them can be supplied only at advanced prices which will be furnished on application. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be considered for publication to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than two pages of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

M. L. FERNALD, 14 Hawthorn Street, Cambridge, Mass.

Subscriptions (making *all remittances* payable to RHODORA) to

Ludlow Griscom, 8 W. King St., Lancaster, Pa., or Museum of Comparative Zoology, Cambridge, Mass.

Entered at Lancaster, Pa. Post Office as Second Class Mail Matter.

INTELLIGENCER PRINTING COMPANY

Specialists in Scientific and Technical Publications

EIGHT WEST KING ST., LANCASTER, PA.

CARD-INDEX OF NEW GENERA, SPECIES AND VARIETIES OF AMERICAN PLANTS, 1885 TO DATE.

For American taxonomists and all students of American plants the most important supplement to the Index Kewensis, this catalogue in several ways exceeds the latter work in detail, since it lists not only the flowering plants, but ferns and other vascular cryptogams, and includes not merely genera and species, but likewise subspecies, varieties and forms. A work of reference invaluable for larger herbaria, leading libraries, academies of sciences, and other centers of botanical activity. Issued quarterly, at $22.50 per 1000 cards.

GRAY HERBARIUM of Harvard University,
Cambridge, Mass., U. S. A.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. DAY. Leatherette. Pocket size. Invaluable for collector's memoranda and herbarium records. Published and sold by the GRAY HERBARIUM, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

MEMOIRS OF THE GRAY HERBARIUM. A series of illustrated quarto papers issued at irregular intervals, sold separately.

No. III. The Linear-leaved North American Species of Potamogeton, Section Axillares, by M. L. Fernald. 183 pp., 40 plates, 31 maps. 1932. $3.00.

Gray Herbarium of Harvard University, Cambridge, Mass.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3/4 in. 1 year $4.00, 6 months $2.50.

Arnica chionopappa: fig. 1, small plant, showing 3-nerved basal leaves, × 1, from Newfoundland; fig. 2, achene and disk-corolla, × 6, from Newfoundland.

A. tomentosa: figs. 3 and 4, small plants, × 1, from Newfoundland; fig. 5, achene and disk-corolla, × 6, from Newfoundland.

ARNICA LOUISEANA: FIG. 1, small plant, × 1, from Newfoundland; FIG. 2, achene and disk-corolla, × 6, from Newfoundland.

A. TERRAE-NOVAE: FIG. 3, small plants, × 1, from Newfoundland; FIG. 4, achene and disk-corolla, × 6, from Newfoundland.

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 35. November, 1933. No. 419.

REPORTS ON THE FLORA OF MASSACHUSETTS,—II.

In making this report it seems desirable to explain certain geographic terms which frequently appear. By the Southeast is meant all that territory south of the southern boundary of Norfolk County. To make it a straight line the townships of Hingham and Hull are excluded from the definition of the Southeast, while the remainder of Plymouth County and all of Bristol, Barnstable, Dukes, and Nantucket Counties are included. Thus the line follows the old boundary between the Massachusetts Bay and the Plymouth Colonies, and by a strange coincidence marks the strongest line of cleavage in both the flora and the past history of the state. The Boston District refers to the same territory covered in the reports of the Committee on that area.[1] Roughly it includes that portion of the East which remains after that part designated the Southeast has been deducted.

The members of this Committee are much indebted to Prof. Fernald and Mr. Weatherby for advice on difficult technical questions involved in the present report.

Since the previous report the Committee has lost a valued member in the death of Judge Joseph Richmond Churchill.

POLYPODIACEAE (Fern Family), addenda to Report I.

ASPLENIUM L. Spleenwort.

A. montanum Willd. Mountain Spleenwort. Great Barrington, *S. Waldo Bailey;* cf. Am. Fern. Jour. xiv. 92 (1924).

[1] Rhodora, ix. 81 (1907).

SCHIZAEACEAE (Curly Grass Family)

LYGODIUM Sw. Climbing Fern.

L. palmatum (Bernh.) Sw. Moist thickets; found locally across the state, except in the Southeast where it is known from two stations in Bristol County. Stations now much reduced.

OSMUNDACEAE (Flowering Fern Family)

OSMUNDA [Tourn.] L.

O. regalis L., var. **spectabilis** (Willd.) Gray. Royal Fern. Swamps and wet woods; occasional in Dukes and Nantucket Counties, frequent elsewhere.

Forma **anomala** (Farwell) S. K. Harris.[1] Range similar to that of typical form.

O. Claytoniana L. Interrupted Fern. Low grounds; common, except in the Southeast, where it is frequent on the mainland, rare on Nantucket (Bicknell, Bull. Torrey Botanical Club, xlv. 365 (1918)) and not reported from Dukes County.

O. cinnamomea L. Cinnamon Fern. Swampy ground; common throughout.

Forma **incisa** (Huntington) Gilbert, N. A. Pterid. 13, 28 (1901). (*O. cinnamomea* var. *incisa* J. W. Huntington). Occasional in the Northeast; Stockbridge and Sandisfield in Berkshire County.

Forma **bipinnatifida** Clute, Fern Bull. xiv. 45 (1906). Medford, *G. E. Davenport*, Brockton, *A. A. Eaton*, Sandisfield, (R. Hoffmann, Proc. Bost. Soc. Nat. Hist. xxxvi. 199 (1922)).

Forma **latipinnula** Blake, Rhodora, xv. 155 (1913). Walpole, *J. R. Churchill*, Canton, *S. F. Blake*.

Forma **frondosa** (T. & G.) Britton, Cat. Pl. N. J. 312 (1890). (*O. cinnamomea* var. *frondosa* T. & G.). Frequent in the Northeast; Scituate in Plymouth County and Sheffield in Berkshire County.

OPHIOGLOSSACEAE (Adder's Tongue Family)

OPHIOGLOSSUM [Tourn.] L. Adder's Tongue.

O. vulgatum L. (Including forma *pseudopodum* Blake). Meadows and pastures; frequent in the western part of the state, becoming occasional eastward.

[1] Osmunda regalis L., var. spectabilis (Willd.) Gray, forma **anomala** (Farwell) S. K. Harris. comb. nov. *O. regalis* L., var. *spectabilis* (Willd.) Gray, subvar. *anomala* Farwell, Am. Midland Nat. xii. 307 (1931).

BOTRYCHIUM Sw. MOONWORT.

(The first four species appear sporadically).

B. simplex E. Hitchcock. Moist woods and fields; local throughout the state except the Southeast.

B. tenebrosum A. A. Eaton. Moist woods and fields; occasional in the Northeast, rare in the Southeast and West. Exact status doubtful, but not quite satisfactorily referable to any of the other species, according to Mr. Weatherby.

B. angustisegmentum (Pease & Moore) Fernald. (*B. lanceolatum* var. *angustisegmentum* Pease & Moore; cf. RHODORA, xvii. 87 (1915)). In rich deciduous woods; frequent in Berkshire County becoming occasional eastward and known only from Sandwich in the Southeast.

B. matricariaefolium A. Br. (*B. ramosum* of Manual). Rich usually deciduous woods; frequent in Berkshire County, becoming occasional eastward and known only from Provincetown, Halifax, and Sandwich in the Southeast.

B. dissectum Spreng. (*B. obliquum* Muhl. var. *dissectum* (Spreng.) Clute; cf. Clute, Fern Bull. x. 76 (1902)). Pastures and open woods; frequent throughout the state.

Forma **obliquum** (Muhl.) Fernald. (*B. obliquum* Muhl.; cf. Fernald, RHODORA, xxiii. 151 (1921)). Occurring over the same range as the typical form and often associated with it.

Forma **oneidense** (Gilbert) Clute. (*B. obliquum* var. *oneidense* (Gilbert) Waters, *B. ternatum* var. *oneidense* Gilbert; cf. Clute, Fern Bull. x. 76 (1902)). Occasional in Essex, Norfolk and Worcester Counties.

Forma **elongatum** (Gilbert & Haberer) Weatherby. (*B. obliquum* var. *elongatum* Gilbert & Haberer; cf. Weatherby, RHODORA, xxiii. 209 (1922)). Rare.

B. multifidum (Gmel.) Rupr., var. **intermedium** (D. C. Eaton) Farwell. (*B. ternatum* var. *intermedium* of Manual; cf. Farwell, Rep. Mich. Acad. Sci. xviii. 87 (1916)). Pastures and open woods; occasional throughout the state except in the Southeast where known only from Eastham and West Tisbury.

B. virginianum (L.) Sw. (Including var. *intermedium* Butters). Rich woods; frequent in the western part of the state, becoming occasional eastward; known only from Sandwich in Barnstable County and not reported from Dukes County.

MARSILEACEAE

MARSILEA L.

M. quadrifolia L. Aquatic; introduced in several rivers and lakes in the northeastern part of the state, also in Egremont and Falmouth.

SALVINIACEAE

AZOLLA Lam.

A. caroliniana Willd. Aquatic; naturalized for some years in Springfield, now probably extinct (cf. Rhodora, xxiii. 212 (1922)). Also reported recently from Falmouth (*J. M. Fogg Jr.*).

EQUISETACEAE (Horsetail Family)

EQUISETUM [Tourn.] L. Horsetail.

E. arvense L. Common Horsetail. Sandy banks and roadsides; common and rather variable.

E. pratense Ehrh. Alluvial soil in calcareous regions; valley of the Connecticut River, and New Marlboro, local.

E. sylvaticum L., var. **pauciramosum** Milde. (*E. sylvaticum* L. of Manual; cf. Rhodora, xx. 131 (1918). Including forma *multiramosum* Fernald). Wet fields and woods; frequent except in the Southeast where it is known only from a few stations in Bristol County.

E. palustre L. (*E. littorale* of Manual; cf. Schaffner, Am. Fern Jour. xxii. 126 (1933)). Shores of Merrimac River at Amesbury and Newburyport.

E. limosum L. (*E. fluviatile* of Manual; cf. Rhodora, xxiii. 43 (1921)). Shallow water and mud-banks; frequent except in the Southeast where known only from rare stations in Plymouth and Bristol Counties, and from Nantucket (Bicknell, Bull. Torr. Bot. Club, xxxv. 54 (1908)).

Forma **minus** A. Br. (Cf. Rhodora, xxiii. 45 (1921)). Amesbury, *A. A. Eaton.*

Forma **verticillatum** Doell. (Cf. Rhodora, xxiii. 45 (1921)). Same general range as the species, but in the Southeast known only from Lakeville and Dighton.

E. hyemale L., var. **affine** (Engelm.) A. A. Eaton. Loose sandy

streambanks; frequent except in the Southeast where known only from Swansea.

E. variegatum Schleich. Sandy or gravelly streambanks; Salisbury in Essex County, Conway and Charlemont in Franklin, and Williamstown, North Adams, Sheffield and Stockbridge in Berkshire.

E. scirpoides Michx. Moist evergreen woods and low fields; rare from the Connecticut Valley westward, unknown eastward except from Amesbury.

LYCOPODIACEAE (Club Moss Family)

LYCOPODIUM [Rupp.] L. Club Moss.

L. Selago L. Subalpine rock crevices; Mt. Greylock in Williamstown and Mt. Holyoke in South Hadley.

L. lucidulum Michx. Cold damp woods; common in Berkshire County and the Connecticut Valley drainage, frequent eastward, rare in the Southeast and not reported from Dukes or Nantucket Counties.

L. inundatum L. Sandy shores and in sphagnum; frequent in the Southeast, occasional elsewhere.

Var. **Bigelovii** Tuckerm. Sandy shores; common in the Southeast, frequent elsewhere in the East, not known west of Middlesex and Norfolk Counties.

Var. **robustum** R. J. Eaton, Rhodora, xxxiii. 201 (1931). Concord, Barnstable, Sheffield.

Var. **alopecuroides** (L.) Tuckerm. (*L. alopecuroides* L.; cf. Fernald, Rhodora, xxiii. 100 (1921)). Sandy swamps; Nantucket, *Bicknell* (Bull. Torr. Bot. Club, xxxv. 55 (1908)), *Dame, Churchill* (Cf. R. J. Eaton, Rhodora, xxxiii. 203 (1931)).

L. annotinum L. Open woods; occasional except in the Southeast whence not reported.

Var. **acrifolium** Fernald, Rhodora, xvii. 124 (1915). Same range as the species but somewhat more frequent.

L. clavatum L. Dry woods; frequent except in the Southeast where known only from New Bedford, Taunton, Norton and Sandwich.

Var. **megastachyon** Fernald & Bissell, Rhodora, xii. 53 (1910). (Var. *monostachyon* of modern authors, not Grev. & Hook.). Dry open ground, especially upland pastures; occasional except in the Southeast whence not reported.

L. obscurum L. Rich woods; occasional in the Southeast, common elsewhere.

Var. **dendroideum** (Michx.) D. C. Eaton. Same range as the species but not reported from Dukes County.

L. complanatum L., var. **flabelliforme** Fernald. Ground Pine. Dry woods; originally common.

L. tristachyum Pursh. Dry sandy soil; locally abundant.

SELAGINELLACEAE

SELAGINELLA Beauv.

S. rupestris (L.) Spring. Dry exposed rocks; locally frequent except in the Southeast where known only from Easton, Seekonk, and New Bedford.

S. apoda (L.) Fernald. (*S. apus* Spring.; cf. Rhodora, xvii. 68 (1915)). Low shady places; frequent except in the Southeast where known only from occasional stations in Bristol and Plymouth Counties.

ISOËTACEAE (Quillwort Family)

ISOËTES L. Quillwort.

I. Braunii Dur. (*I. echinospora* var. *Braunii* and var. *muricata* of Manual; cf. Pfeiffer, Ann. Mo. Bot. Gard. ix. 156 (1922)). Muddy or sandy river and pond margins; several stations in Bristol County in the Southeast, frequent about Boston and northward, only scattered stations in Worcester County and westward but this seeming rarity is due presumably to lack of collecting.

Forma **robusta** (Engelm.) Pfeiffer. (*I. Gravesii* A. A. Eaton; cf. Pfeiffer, ibid. 173). Cited from Massachusetts under the name of *I. Gravesii;* cf. Manual, 61.; Enfield, *Goodale, Potsubay & St. John.*

I. Eatoni Dodge. Borders of ponds and streams; Amesbury, in Parker River, Byfield, and North Easton (Cf. Pfeiffer, ibid. 178).

I. riparia Engelm. (Including *I. saccharata* Engelm., var. *Amesii* A. A. Eaton). Muddy banks or gravelly bottom, amphibious; occasional around the Boston District, in the Southeast known only from Taunton and Easton, and in the West only from Amherst (Cf. Pfeiffer, ibid, 182), Holyoke, and Enfield.

Var. **canadensis** Engelm. (Including *I. Dodgei* and its var. *Robbinsii*). Peabody, Taunton, Uxbridge. (Cf. Pfeiffer, ibid. 185).

I. macrospora Dur. (Including var. *heterospora* and *I. Tuckermani* var. *Harveyi*). Gravelly or rocky shores, submersed; Cambridge, Uxbridge. (Cf. Pfeiffer, ibid. 194).

I. Tuckermani A. Br. Muddy shores; frequent in Essex and Middlesex Counties, occasional in Bristol, Barnstable and Dukes, and the Connecticut Valley.

I. foveolata A. A. Eaton, var. **plenospora** A. A. Eaton. Gravelly shores; North Easton.

I. Engelmanni A. Br. (Including var. *gracilis* Engelm.). Muddy shores, amphibious; occasional in the Boston District, in the Southeast known only from Dartmouth, New Bedford and Gosnold.

TAXACEAE (Yew Family)

TAXUS [Tourn.] L. Yew.

T. canadensis Marsh. American Yew, Ground Hemlock. Rich evergreen or mixed woods; rare in the eastern part of the state, becoming frequent in northwestern Middlesex County and in Worcester County and westward, unknown in the Southeast except from Norwell.

PINACEAE (Pine Family)

PINUS [Tourn.] L. Pine.

P. Strobus L. White Pine. Light sandy or rather basic soil, or sometimes swamps; common except on the outer part of Cape Cod and on Nantucket where only a single tree is recorded (Bicknell, Bull. Torr. Bot. Club, xliv. 371 (1917)).

P. rigida Mill. Pitch Pine. Sandy or barren soil; common in the Southeast, frequent elsewhere in the East, becoming only occasional westward.

P. Banksiana Lamb. Gray Pine, Northern Scrub Pine. Barren sandy or rocky soil; planted as a soil binder along the state roads, introduced on Nantucket (Bicknell, Rhodora, xviii. 241 (1916)). Doubtful if really established anywhere within the state.

P. sylvestris L. Scotch Pine, Scotch Fir. Planted throughout the state and becoming established locally on light sandy soil, especially in the Southeast.

P. resinosa Ait. Red Pine. Light sandy loam and dry rocky ridges; rare, not known from the Southeast except an introduced stand in Falmouth.

LARIX [Tourn.] Adans. Larch.

L. laricina (Du Roi) K. Koch. American Larch, Black Larch, Tamarack, Hackmatack. Cold swamps and wet hillsides at higher altitudes westward; common from Berkshire to northern Worcester County, occasional eastward, and not known in the Southeast except from introduction.

L. decidua Mill. Widely cultivated and occasionally becoming established.

PICEA Link. Spruce.

P. glauca (Moench.) Voss. (*P. canadensis* of Manual; cf. Rhodora, xvii. 62 (1915)). White Spruce, Cat Spruce. Introduced and locally established.

P. rubens Sarg. (*P. rubra* of Manual; cf. Rhodora, xxxiv. 211 (1932)). Red Spruce. Rocky upland woods; occasional except in the Southeast where known only from Pembroke.

Forma **virgata** (Rehder) Fernald & Weatherby, Rhodora, xxxiv. 211 (1932). Williamstown, *Walker*.

P. mariana (Mill.) BSP. Black Spruce, Bog Spruce. Cold bogs; occasional, but not known from the Southeast.

P. Abies (L.) Karst. Norway Spruce. Widely cultivated and becoming established locally.

ABIES [Tourn.] Hill. Fir.

A. balsamea (L.) Mill. Balsam Fir, Balm-of-Gilead Fir. Swamps and moist slopes; occasional in Berkshire County and the extreme northern part of the state eastward; introduced and locally established elsewhere.

TSUGA (Endl.) Carr. Hemlock.

T. canadensis (L.) Carr. Moist hilly or rocky woods; frequent in the Boston District, becoming common westward; in the Southeast occasional in Bristol County, rare in Plymouth and unknown elsewhere.

CHAMAECYPARIS Spach. White Cedar, Cypress.

C. thyoides (L.) BSP. Swamps; occasional about Boston and from southern Worcester County west to the Connecticut Valley, frequent in the Southeast on the mainland but not known from Nantucket, and from Gosnold only, in Dukes County.

THUJA L.

T. OCCIDENTALIS L. ARBOR VITAE, WHITE CEDAR. Widely cultivated, and in a few rare instances producing seedlings.

JUNIPERUS [Tourn.] L. JUNIPER.

J. communis L. COMMON JUNIPER. Dry soil; occasional from Worcester County westward.

Var. **depressa** Pursh. Poor rocky soil, pastures; frequent from Essex to northern Plymouth and Bristol Counties and westward, known only from Gosnold in Dukes County, and not reported from Barnstable or Nantucket Counties.

J. virginiana L. RED CEDAR, SAVIN. Dry soil; common.

J. R. CHURCHILL
A. S. GOODALE
R. H. GOODWIN
F. W. GRIGG
S. K. HARRIS
DAVID POTTER
G. B. ROSSBACH
S. N. F. SANFORD
L. B. SMITH, *Chairman*

Committee on the Flora of Massachusetts.

NOTES ON THE FLORA OF COLUMBIA, MISSOURI[1]

FRANCIS DROUET

DURING the period following the appearance of Rickett's *Flora* (Univ. Mo. Stud. **6** (1). 1931), more than a thousand specimens of vascular plants of the vicinity of Columbia have been added to the Herbarium of the University of Missouri; and many of the older specimens have been critically examined by H. W. Rickett, B. F. Bush, and myself. The annotated list of species given below summarizes the results of this work to the present date. New species have been added; a few changes have been made in the nomenclature of the *Flora;* some "lost" species have been restored; and new localities have been reported for rare species. The common species of *Crataegus, Rubus, Vernonia, Aster, Helianthus,* and other large genera may

[1] Published with aid of a grant to RHODORA from the National Academy of Sciences.

require, for critical determination, several years of intensive field and laboratory work. The knowledge of our local flora is far from complete.

In May 1932, G. W. Bohn and I discovered *Iris foliosa* Mack. & Bush growing in a springy depression in the valley of Hinkson Creek opposite Devil's Elbow. The only previous report of this iris is by Daniels (Univ. Mo. Stud., Sci. Ser., **1** (2). 1907) from a swamp south of Hinkson Creek. Later in the season, *Thalictrum dasycarpum* Fisch. & Lall., *Lobelia cardinalis* L., *Polygonum sagittatum* L., and *Rudbeckia subtomentosa* Pursh, species reported by Daniels from the "swamp south" and since considered "lost," were found in abundance in the same locality. Daniels stated (Ibid., p. 27) that at the time he was collecting the swamp was being drained. Of this swamp we find left today only an acre or so of marsh meadow and a ditch for drainage, all of which becomes a jungle of tall weeds in the late summer. A striking feature of the place is a large colony of *Onoclea sensibilis* L., a fern of rare occurrence in our vegetation. In late summer, the marsh proper and the upper portion of the drain are covered with *Bidens involucrata* Nutt. and beneath this dense growth one finds other species growing vigorously: *Lobelia siphilitica* L., *Penthorum sedoides* L., *Helenium altissimum* Link, *Agalinis tenuifolia* var. *macrophylla* (Benth.) Blake, etc.

Dr. H. W. Rickett investigated the sandstone bluffs of Hinkson Creek eight miles north of Columbia, also in May 1932. It is an unusual feature in our region to find outcrops of sandstone; in Boone County almost every exposed mass of rocks is of limestone. Here are shady banks inhabited by large colonies of *Aplectrum hyemale* (Muhl.) Torr., *Cypripedium parviflorum* Salisb., and *Orchis spectabilis* L., elsewhere in the region quite rare. Ferns are also abundant, notably *Asplenium angustifolium* Michx., *Athyrium angustum* (Willd.) Presl, *Onoclea sensibilis* L., *Phegopteris hexagonoptera* (Michx.) Fée, and *Botrychium virginianum* (L.) Sw. This region is an interesting addition to the varied habitats characteristic of the vicinity of Columbia.[1]

In the list below, the nomenclature and arrangement of species are the same as those of Rickett's *Flora*. Names of plants not bearing a specific citation of literature will be found in Rydberg's *Flora of the Prairies and Plains* (1932). An asterisk (*) before a name denotes

[1] See Rickett, H. W. Notes on the vegetation of Columbia, Mo. Amer. Midl. Nat. 12 (10): 411–419. 1931.

that the species is new to the flora. Collectors' names appear in italics, as do the numbers of their collections.

B. F. Bush has examined most of the specimens quoted below; and through his kindness many of them have been sent to E. J. Palmer, L. H. Bailey, and others. A. S. Hitchcock examined various sheets of grasses. Specimens have been collected and studied by H. W. Rickett, W. E. Maneval, Lisle Jeffrey, E. E. Naylor, G. Weston Bohn, C. M. Tucker, Albert Saeger, C. G. Schmitt, C. A. Benson, and Sarah Mock. Miss Mock has kindly allowed us to transfer a number of specimens by Max Van Horn, 1925, from Trenton Junior College to our permanent collection. J. A. Steyermark has given many helpful suggestions.

List of Species[2]

*Athyrium angustum (Willd.) Presl. *Asplenium Filix-femina* Am. Auth. Sandstone bluffs of Hinkson Creek, *Bohn*, May 9, 1933; *Drouet 396*, May 18, 1933.

Notholaena dealbata (Pursh) Kunze. Cliffs in Howard Co., just west of Rocheport, *Drouet & Jeffrey*, Apr. 24, 1933.

Phegopteris hexagonoptera (Michx.) Fée. *Thelypteris hexagonoptera* (Michx.) Weatherby. Sandstone bluffs of Hinkson Creek, *Rickett 353*, May 14, 1932; *Drouet 404*, May 18, 1933. Reported by Tracy (Rep. Mo. State Hort. Soc. 1885 (appendix)) from Boone Co.

*Botrychium obliquum Muhl. Twelve miles north, *Jeffrey*, May 11, 1933.

Sagittaria heterophylla Pursh. Pond in the County Road Prairie, *Jeffrey & Drouet*, June 24, 1933.

Alopecurus geniculatus var. ramosus (Poir.) Blake. *A. ramosus* Poir. All specimens hitherto referred to *A. geniculatus* L. See Rhodora **19**: 165–166. 1916.

Andropogon virginicus L. By far the most common Andropogon in Boone Co. *Saeger*, 1919; *Drouet 205*, Sept. 17, 1932; *Drouet 288*, Nov. 14, 1932.

Bromus japonicus Thunb. Including *B. arvensis* of the *Flora*.

Bromus secalinus L. *B. racemosus* of the *Flora*.

*Chloris verticillata Nutt. University Campus, *Drouet 619*, July 3, 1933. Reported previously (*Maneval*), but not collected.

[2] W. E. Maneval reports the following from the vicinity of Columbia: *Conringia orientalis* (L.) Dumort. (McBaine, 1918), *Psoralea digitata* Nutt. (Centralia, 1920), *Polygala verticillata* var. *ambigua* (Nutt.) Wood (Centralia, 1920), *Gentiana puberula* Michx. (Centralia, 1917), *Ambrosia psilostachya* DC. (McBaine and Centralia, 1917. See the *Flora*, p. 72), *Liatris elegans* (Walt.) Willd. (Centralia, 1924. See Daniels' *Flora*, p. 253), *Liatris spicata* (L.) Willd. (Centralia, 1917), and *Prenanthes aspera* Michx. (Centralia, 1917). These collections are not represented in our herbarium.

ELYMUS ROBUSTUS Scribn. & J. G. Sm. Embankments of M. K. & T. Railroad, *Daniels*, July 1903. Since observed at other stations.

PANICUM XALAPENSE HBK. By Providence Road south of Hinkson Creek, *Drouet 453*, June 1, 1933.

*SPOROBOLUS ASPER (Michx.) Kunth. University Farm, *Maneval*, Sept. 29, 1931.

*ALLIUM MUTABILE Michx. Collected at several stations, 1933 (*Drouet, Jeffrey*).

*ALLIUM VINEALE L. University Farm, *Schroeder, Jeffrey & Drouet*, June 1933.

LILIUM MICHIGANENSE Farwell. *L. superbum* of the *Flora*. Honeysuckle Spring, *Howell*, June 20, 1933; County Road Prairie, *Drouet*, June 24, 1933. See Bull. Torr. Bot. Club **42**: 353. 1915.

TRILLIUM RECURVATUM Beck. Bell's Lake, *Fulkerson*, May 1, 1926; *Anonymous*, 1926; Rocheport, *Schmitt*, Apr. 21, 1933, and *Drouet 359*, Apr. 24, 1933.

IRIS FOLIOSA Mack. & Bush. Rediscovered in "swamp south," *Bohn & Drouet*, June 2, 1932, *Drouet 497*, June 7, 1933.

IRIS VIRGINICA L. Marsh north of Rocheport in Howard Co., *Naylor*, May 22, 1932, *Drouet 431*, May 30, 1933; bottoms of Missouri River just west of Rocheport, *Drouet 424*, May 30, 1933.

APLECTRUM HYEMALE (Muhl.) Torr. Sandstone bluffs of Hinkson Creek, *Rickett 360*, May 16, 1932, *Drouet 402*, May 18, 1933; woods at Dulle Mill in Callaway Co., *Drouet 307*, April 9, 1933.

*CORALLORRHIZA WISTERIANA Conrad. Hill near Bear Spring, *Rickett 237*, May 16, 1932; University Farm, *Bohn*, May 1933. Reported but not collected near Rock Bridge (*Rickett*) and at McBaine (*Maneval*).

HABENARIA LACERA (Michx.) R. Br. County Road Prairie, *Jeffrey & Drouet*, June 3, 1933. See the *Flora*, p. 25.

POLYGONUM BUXIFORME Small. Daniels' *P. littorale*. *Favor*, 1901; *Daniels*, July 1903; *Rickett*, July 30, 1927.

POLYGONUM SAGITTATUM L. Rediscovered in "swamp south," *Drouet 110*, Aug. 4, 1932, *Drouet 188*, Sept. 2, 1932.

CHENOPODIUM MURALE L. "Yards, etc." *Daniels*, 1897. Labeled *C. urbicum* L.

AMARANTHUS BLITOIDES S. Wats. All specimens hitherto referred to *A. graecizans* L.

AMARANTHUS GRAECIZANS L. Ridge four miles north, *Drouet 589*, June 27, 1933; horticultural grounds, University of Missouri, *Drouet 602*, July 1, 1933.

*DIANTHUS ARMERIA L. *Maneval*, 1931.

*LYCHNIS ALBA Mill. University orchard, *Schmitt*, June 5, 1933.

CLAYTONIA ROBUSTA (Somes) Rydb. "Boone Co.," *Favor*, 1901.

MYOSURUS MINIMUS L. At several new stations (*Drouet*).

THALICTRUM DASYCARPUM Fisch. & Lall. Recently found at several stations (*Drouet*).

ARABIS HIRSUTA (L.) Scop. Honeysuckle Spring, *Drouet 552*, June 24, 1933. Reported by Tracy (*loc. cit.*) from Boone Co.

*DRABA BRACHYCARPA Nutt. Banks of Hinkson Creek south, *Tucker*, Apr. 1932, *Tucker & Drouet*, Apr. 12, 1933.

*THLASPI ARVENSE L. Flats of Hinkson Creek east, *Jeffrey*, May 28, 1933. Reported but not collected from the railroad at Rocheport in 1917 (*Maneval*).

HEUCHERA RICHARDSONII var. GRAYANA Rosend., Butt. & Lak. Specimens heretofore referred to *H. hispida* Pursh. See RHODORA **35**: 118–119. 1933.

RUBUS ABACTUS Bailey. Old Quarry, *Rickett*, 1927. See Gentes Herb. **2** (7): 452.

*RUBUS OSTRYIFOLIUS Rydb. Limerick, *Drouet*, May 27, 1932. See Gentes Herb. **2** (6): 392.

DESMODIUM ILLINOENSE Gray. County Road Prairie, *Drouet 557*, June 24, 1933, *Drouet 601*, July 1, 1933. Reported from Centralia (*Maneval*, 1924), but not collected. Listed by Daniels.

DESMODIUM ROTUNDIFOLIUM (Torr.) T. & G. Dulle Mill, *Rickett 249*, May 14, 1932.

LATHYRUS PALUSTRIS L. "Boone Co.," *Tracy*, July 2, 1885. Reported by Tracy (*loc. cit.*).

VICIA VILLOSA Roth. *V. Cracca* of the *Flora*. *Daniels*, June 1905; *Drouet*, May 19, 1932; *Drouet 570*, June 27, 1933.

*LINUM MEDIUM (Planch.) Britton. County Road Prairie, *Jeffrey & Drouet*, June 24, 1933.

*ERODIUM CICUTARIUM L. Campus, *Rickett*, Mar. 29, 1933.

*TRIBULUS TERRESTRIS L. Railroad at McBaine, *Naylor*, June 30, 1932.

RHUS CANADENSIS var. TRILOBATA (Nutt.) Gray. Bluffs of Hinkson Creek south, *Rickett*, Apr. 24, 1927, *Drouet 409*, May 21, 1933.

RHAMNUS CATHARTICA Nutt. Specimen labeled *Ligustrum vulgare* L., Daniels, 1904. See the *Flora*, p. 51.

VIOLA MISSOURIENSIS Greene. Bottoms at Rocheport, *Schmitt*, Apr. 21, 1933, *Drouet 355*, Apr. 24, 1933; Brushwood Lake, *Drouet 623*, July 4, 1933.

VIOLA SAGITTATA Ait. County Road Prairie, *Drouet 471*, June 3, 1933.

CORNUS RACEMOSA Lam. *C. paniculata* L'Hér. Rare along Gans Creek, *Rickett 382*, Nov. 5, 1932.

VACCINIUM VACILLANS var. CRINITUM Fernald. The *V. vacillans* of the *Flora*. RHODORA **13**: 236. 1911. Recently discovered on bluffs of Grindstone Creek (*Jeffrey & Drouet*).

ACERATES VIRIDIFLORA var. LANCEOLATA (Ives) Gray. Railroad at Centralia, *Maneval*, July 19, 1931.

CUSCUTA POLYGONORUM Engelm. *C. obtusiflora* of the *Flora*. See Mem. Torr. Bot. Club **18** (2): 130. 1930.

*MONARDA PUNCTATA L. *Van Horn*, 1925.

Nepeta hederacea (L.) Trevisan. Abundant at Honeysuckle Spring, *Drouet*, Apr. 8, 1932.

*Gratiola virginiana L. *G. sphaerocarpa* Ell. Pond at Persinger, *Jeffrey & Drouet*, June 27, 1933; pond in County Road Prairie, *Drouet 596*, July 1, 1933. See Rhodora **20**: 65. 1918.

Pentstemon tubiflorus Nutt. *Daniels*, June 1903.

*Lonicera japonica Thunb. Persisting on a high shaded bank at Honeysuckle Spring, *Rickett 12*, May 3, 1931, *Baker*, June 11, 1931. Also observed spreading along roadsides and in abandoned yards.

Triosteum perfoliatum var. aurantiacum (Bicknell) Wieg. *T. aurantiacum* Bickn. "Open woods," *Daniels*, Aug. 1902. See Rhodora **25**: 199. 1923.

*Viburnum Bushii Ashe. Limerick, *Drouet 382*, May 5, 1933; near Lover's Leap, *Drouet 488*, June 7, 1933; Bear Spring, *Jeffrey*, June 12, 1933; Persinger, *Drouet 588*, June 27, 1933. See Journ. Elisha Mitchell Sci. Soc. **40**: 48. 1924.

*Dipsacus sylvestris Huds. Hillside by Grindstone Creek, *Rickett 246*, May 7, 1932.

Echinocystis lobata (Michx.) T. & G. A specimen consisting of a portion of a dried fruit, *Daniels*, 1897, has recently been discovered.

Specularia leptocarpa (Nutt.) Gray. Hermit Hill, *Drouet*, June 8, 1932, *Drouet 406*, May 21, 1933; hills along Bonne Femme Creek, *Jeffrey & Drouet*, June 24, 1933.

Lobelia cardinalis L. Rediscovered in "swamp south," *Drouet 185*, Sept. 2, 1932, *Mock & Drouet*, Aug. 4, 1932. Reported from low ground along Cedar Creek (*Jeffrey*).

Helenium altissimum Link. The *H. autumnale* of the *Flora*. See N. Am. Fl. 34 (2): 126.

Kuhnia suaveolens Fresen. *K. eupatorioides* var. *corymbulosa* T. & G. All specimens previously called *K. eupatorioides*.

Rudbeckia fulgida L. "Edge of cliff n. w. of dam," *Daniels*, 1903.

Rudbeckia subtomentosa Pursh. Rediscovered in "swamp south" and vicinity, *Drouet 109 & 114*, Aug. 4, 1932, *Drouet 184*, Sept. 2, 1932.

Solidago speciosa Nutt. Abundant in "thickets on bluffs" above Hinkson Creek, as described by Daniels (ibid., p. 225). See Rickett's comment in the *Flora*, p. 80.

Department of Botany,
University of Missouri.

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. Fernald

(*Continued from page 346*)

Arnica tomentosa J. M. Macoun, Pittonia, iv. 168 (1900). *A. pulchella* Fern. Rhodora, xvii. 18 (1915), xxvi. 104, t. 143, fig. 2 (1924). St. John Bay: peaty and turfy margins of dry limestone

barrens, Old Port au Choix, *Fernald, Long & Fogg*, nos. 2127, 2128; turfy margins of gravelly limestone barrens, Eastern Point, no. 2129. PLATE 269, FIGS. 3–5.

The Newfoundland plants are mostly much larger than the Rocky Mt. specimens (just as are those of *A. Louiseana*), but I am unable to find any morphological detail to separate them. The species is well named, the very white-tomentose stems, involucres and erect basal leaves shining in the sunlight like white silver. The plants about St. John Bay are excessively tomentose, but the series shows such transition to the plant of Table Mt., Port au Port Bay, described as *A. pulchella*, that it is necessary to reduce *A. pulchella* to *A. tomentosa*. The disruption of range of this species is strikingly like that of *A. chionapappa* Fern. (MAP 29) and of *A. Louiseana* (MAP 30). See p. 53.

*A. PLANTAGINEA Pursh. PISTOLET BAY and HA-HA BAY: turfy limestone barrens, Cape Norman, *Wiegand, Griscom & Hotchkiss*, nos. 29,213; mossy talus of diorite cliffs, Ha-Ha Mt., *Fernald & Long*, no. 29,215.

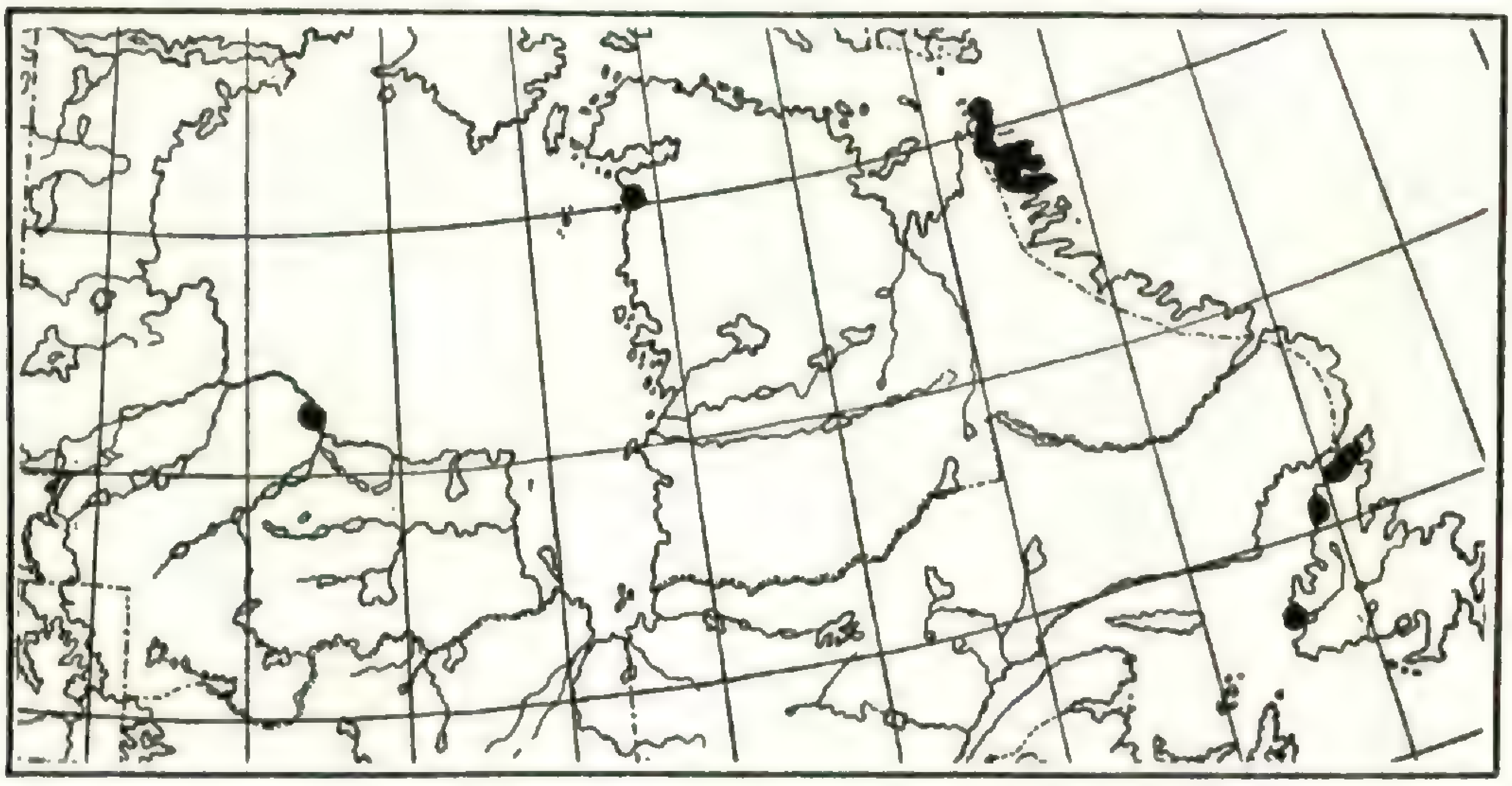
Arnica plantaginea, heretofore recorded only from the northern part of the Labrador Peninsula, was collected in northern Newfoundland in 1925, the material then misidentified and reported as *A. pulchella* Fern.

A. TERRAE-NOVAE Fern. RHODORA, xxvii. 90 (1925). PLATE 270, FIGS. 3 and 4.

Arnica terrae-novae proves to be more generally distributed on calcareous rocks and gravels of western Newfoundland than at first supposed (see p. 53). Furthermore, the beautifully prepared material, brought back from northern Labrador by Mr. Ernst C. Abbe of the Grenfell-Forbes Northern Labrador Expedition of 1931, supplementing that secured by Dr. R. H. Woodworth, shows that the Labrador plant which has erroneously passed as *A. alpina* (L.) Olin is *A. terrae-novae* (MAP 28); and Mr. Abbe and I find that *A. terrae-novae* extends to the west of Hudson Bay. From true *A. alpina* of subarctic Europe *A. terrae-novae* is at once distinguished by its much narrower basal leaves, its usually less scapose habit, and less lacerate ligules. *A. terrae-novae* is as nearly related to *A. attenuata* Greene, of northwestern America, as to the Scandinavian *A. alpina*. *A. attenuata* is of more delicate texture (drying paler-green), with usually more branching stems, and its basal leaves are clearly 5-nerved, with 2 outer less conspicuous nerves, the basal leaves of *A. terrae-novae* being clearly 3-nerved, sometimes with 2 faint laterals. In *A. terrae-novae* glandular

hairs abound at the summit of the peduncle and at the base of the involucre; in *A. attenuata* they are absent or completely hidden in the dense tomentum. No mature fruits of *A. attenuata* are available, but the flowering material suggests longer achenes and longer pappus.

The following belong to A. terrae-novae. Labrador: Ekortiarsuk, Cape Chudleigh, *C. S. Schmitt*, no. 312; on sandy old sea bottom, Head of Ryan's Bay, *Woodworth*, no. 428; on granitic rock, old sea beaches, Northwest Bank at Head of Ryan's Bay, *Woodworth*, no. 430; moist meadowy hillsides, Near Island, Seven Islands Bay, Kangalaksiorvik, *Abbe*, no. 572; 20 miles north of Nachvak, August 28, 1908, *H. S. Forbes;* moist gully in cliff on north side of Razorback Harbor, *Abbe*, no. 573; on granite cliffs at 150–600 m., Head of Nach-



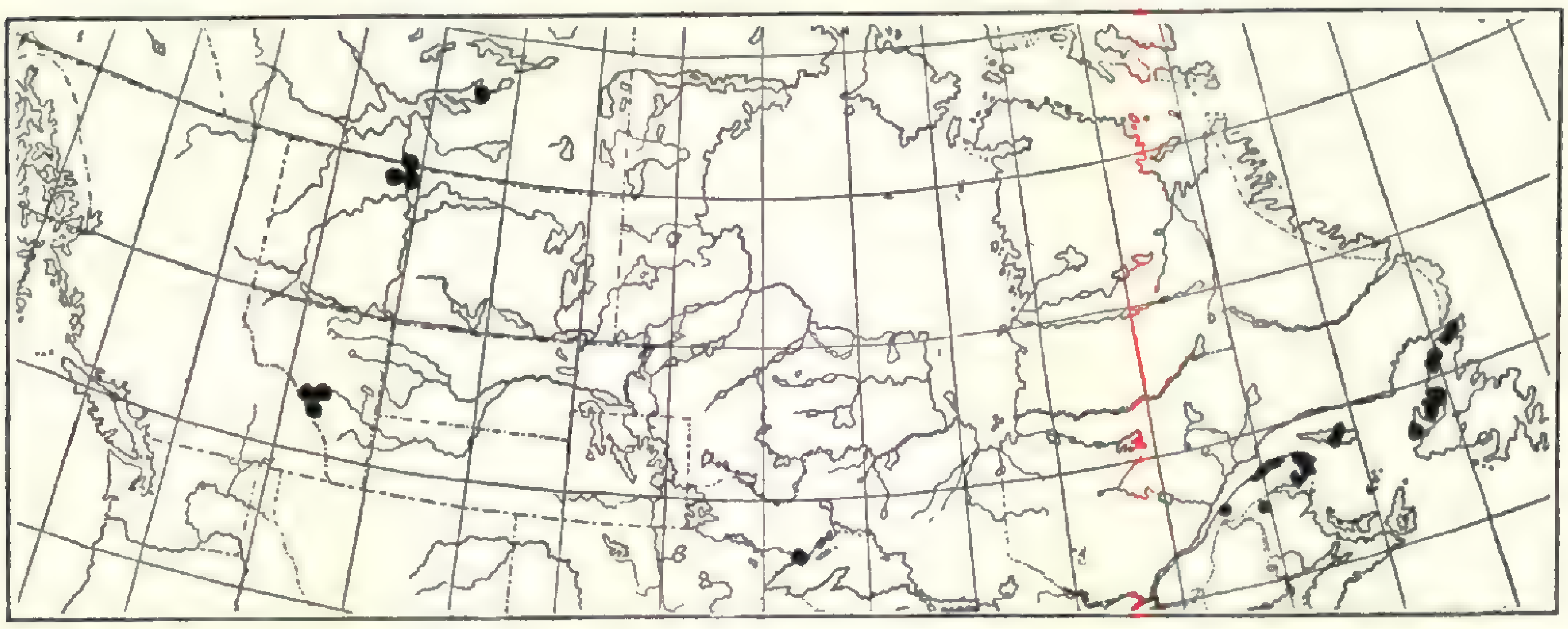
Map 28. Range of Arnica terrae-novae.

vak Bay, *Woodworth*, no. 429; slaty talus slope, Rowsell Harbor, *Abbe*, nos. 570, 571; prope Hebron (as *A. angustifolia* Vahl), *Mentzel;* Hebron, August 4, 1908, *H. S. Forbes*. Ungava: Mosquito Bay, *A. P. Low*, Herb. Geol. Surv. Can. no. 23,019. Newfoundland: turfy limestone barrens, Burnt Cape, Pistolet Bay, *Fernald et al.*, nos. 29,209, 29,210½; turfy limestone barrens, Cook Point, *Fernald & Gilbert*, no. 29,214; limestone barrens, one mile back of Savage Cove, Straits of Belle Isle, *Fernald & Long*, no. 29,207, *Fernald, Pease & Long*, no. 29,208; turfy and peaty margins of dry limestone barrens, Old Port au Choix, Eastern Point, Port au Choix and Gargamelle Cove, *Fernald, Long & Fogg*, nos. 2123–2126; limestone barrens, Green Gardens, Cape St. George, *Mackenzie & Griscom*, no. 11,039 (type). Manitoba: Kettle Rapids, July 15, 1917, *J. H. Emerton*. Keewatin: Maguse Lake, *W. C. Gussow*, no. 44 (seen since map 28 was engraved).

Arnica chionopappa Fern. Rhodora, vii. 148 (1905), xxvi. 105, t. 143, fig. 5 (1924). The commonest Arnica of western Newfoundland,

secured at many new stations on Bay of Islands, Bonne Bay, Ingornachoix Bay and St. John Bay. PLATE 269, FIGS. 1 and 2.

Arnica chionopappa, originally described from Gaspé and adjacent northern New Brunswick, is of rather general range about the northern half of the Gulf of St. Lawrence. It is also frequent in Mackenzie and Alberta; and recently Professor F. K. Butters has brought me thoroughly characteristic material from northeastern Minnesota. It is probably of more general occurrence on calcareous areas across Canada (MAP 29). Rydberg, N. Am. Fl. xxxiv. 332 (1927) reduces the Gaspé *A. chionopappa* to *A. arnoglossa* Greene, of the Black Hills; and on the opposite page (333) describes the Newfoundland *A. chionopappa* as a new species, *A. Fernaldii* Rydb. I have before me 15 numbers of the Newfoundland plant, representing all stages from



Map 29. Range of ARNICA CHIONOPAPPA.

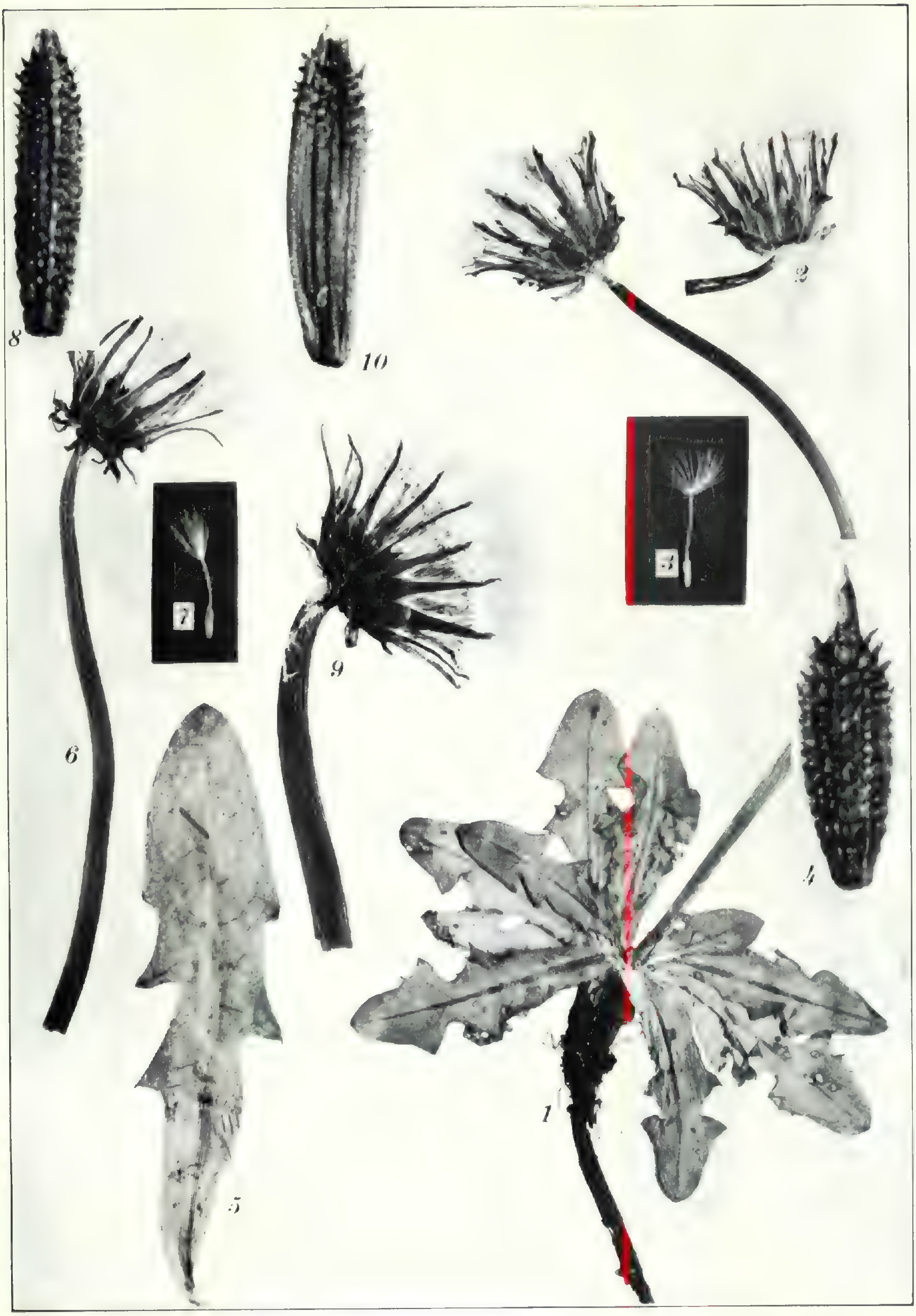
bud to ripe fruit, 19 numbers, similarly diverse in state of development, of the Gaspé plant, 3 numbers from Anticosti and 1 from New Brunswick. I am quite unable to detect any constant difference in the series. It is consistently different from the plant of the Black Hills, however (*A. arnoglossa*), in having pilose involucres, all the Black Hills material having them glandular-puberulent and scarcely pilose. The disk-corollas of *A. arnoglossa* are slenderly funnel-form, with exceedingly short pilosity on the tube; those of *A. chionopappa* (including *A. Fernaldii*) goblet-shaped, with the pubescence of the tube much longer than in *A. arnoglossa*. So far as material in the Gray Herbarium shows, *A. arnoglossa* is restricted to the Black Hills. The material from Alberta and Mackenzie, of which Dr. Raup has secured many numbers, seems inseparable from *A. chionopappa*. See pp. 51, 53, 81.

A. Louiseana Farr, Ott. Nat. xx. 109 (1906). *A. Griscomi* Fern. Rhodora, xxvi. 105, t. 143, fig. 7 (1924). To the one station heretofore known from Newfoundland add the following from St. John Bay and Ingornachoix Bay: turfy margins of gravelly limestone barrens, and turfy slopes below limestone barrens, Eastern Point, *Fernald, Long & Fogg*, nos. 2139, 2140; dominant on turfy talus of limestone sea-cliffs, Eastern Point, no. 2141; peaty and turfy knolls and banks bordering dry limestone barrens southwest of Port au Choix, no. 2142; turfy terraces and slopes on limestone barrens, Pointe Riche, no. 2143. Plate 270, figs. 1 and 2.

Arnica Louiseana was described by Miss Farr from mountains about Lake Louise in the Canadian Rocky Mts. The original description emphasized the nodding flowering heads: "Heads of flowers 1–3, usually 3, fragrant, 4 cm. broad, borne on long, slender, nodding . . peduncles"; and again "The pale yellow color of the flowers and their drooping tendency distinguish it from other Arnicas of the region." Furthermore, the colored illustration of the original collection made by Miss Farr's associate, Mrs. Schäffer,[1] shows a very small plant with definitely nodding small heads. Consequently, when the Gaspé plant with large erect flowering heads was studied, the highly localized species (*A. Louiseana*) of Lake Louise, more than 2200 miles away, was passed as certainly not to be further considered. Subsequently, three sheets of *A. Louiseana,* including an isotype of the species, have come to the Gray Herbarium. They all agree with the smaller individuals of *A. Griscomi* in every character; and in all of the 12 individuals under these numbers the flowering and fruiting heads are quite erect! It is surmised that, when Mrs. Schäffer made her drawing, which later influenced Miss Farr's diagnosis, the specimens had twisted or bent so that the peduncles had become curved at summit—one of the commonest mishaps in collecting. This assumed post-morten bending toward the light of the peduncles in the plant drawn by Mrs. Schäffer hardly justifies the very fundamental separation of *A. Louiseana* from *A. Griscomi* in the North American Flora, xxxiv. part 4: 322–325 (1927). There Rydberg includes *A. Louiseana* in his § *Obtusifoliae,* "Heads nodding in anthesis"; while *A. Griscomi* is placed in two other sections, §§ *Alpinae* and *Arnoglossae*, with "Heads erect in anthesis."

We saw much of *Arnica Louiseana* about Port au Choix, where it makes extensive carpets (see p. 53). Its very young heads (in young bud) are somewhat nodding but when they expand they are quite

[1] Brown & Schäffer, Alp. Fl. Can. Rky. Mts. plate opp. p. 304 (1907).



Taraxacum ceratophorum: figs. 1 and 2, small plant and individual head, × 1, from Newfoundland; fig. 3, achene, with beak and pappus, × 1; fig. 4, achene, × 10.

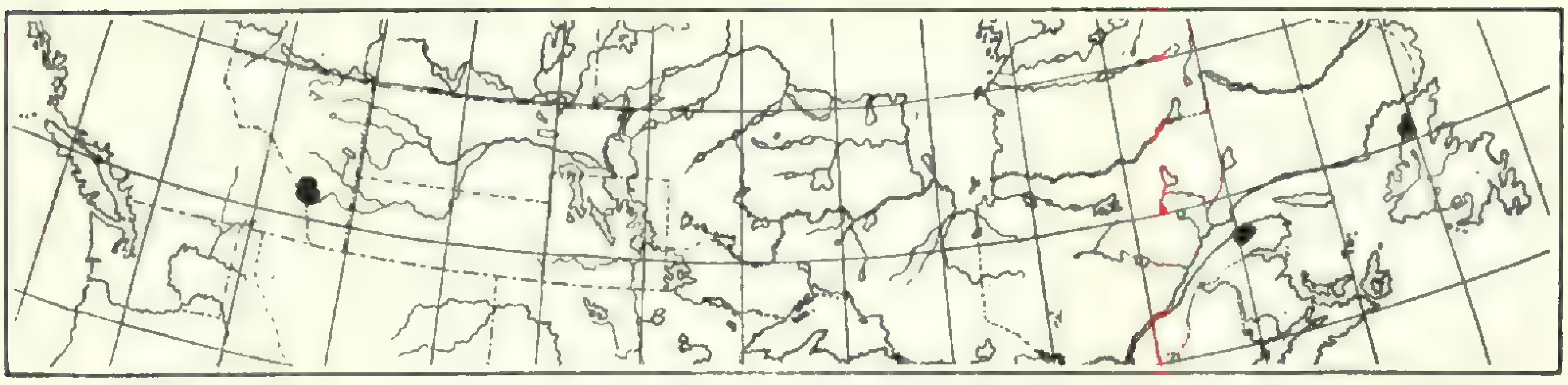
T. ambigens: fig. 5, small leaf, × 1, from the type, Port au Choix, Newfoundland; fig. 6, head, × 1, from the type; fig. 7, achene, with beak and pappus, × 1, from the type; fig. 8, achene, × 10, from the type.

T. ambigens, var. fultior: fig. 9, head, × 1, from the type, Gargamelle Cove, Newfoundland.

T. lapponicum: fig. 10, achene, × 10, from Newfoundland.

erect. This species forms more extensive carpets than the others in Newfoundland, owing to a definitely stoloniferous habit. It has either variously leafy or bracted stems or is acaulescent (those who divide the *Senecioneae* primarily on habit and foliage could recognize a dozen artificial segregates from a single habitat). It varies in stature from 0.5–2.5 dm., with basal leaves 1.5–12 cm. long, and 0.6–3 cm. broad. The flowering branches may have 1–5 heads and these vary from 2.5–5 cm. broad.

The striking disruption of range (MAP 30) shown by *A. Louiseana* is a very frequent one, discussed at length in some other papers.



Map 30. Range of ARNICA LOUISEANA.

CIRSIUM MUTICUM Michx., forma **lactiflorum**, n. f., floribus lacteis.—NEWFOUNDLAND: talus of limestone cliff opposite Lomond, August 10, 1929, *Fernald, Long & Fogg*, no. 2151.

A considerable colony near the base of the cliff opposite Lomond has milk-white instead of the usual purple flowers.

C. PALUSTRE (L.) Scop. LOWER HUMBER VALLEY: "Railway gravel" near Humbermouth, 1910, *Fernald, Wiegand & Kittredge*, no. 4192; springy glades in spruce woods between Marble Mt. and Humbermouth, *Fernald, Long & Fogg*, no. 2153, *Fernald & Long*, no. 2154.

In 1910 Wiegand and I took *Cirsium palustre* to be an introduction, which we associated with the near-by railway. In 1929, however, the plant appeared like a native element in the wet glades and thickets, sharing them with strictly indigenous plants. See p. 15.

TARAXACUM IN EASTERN AMERICA.—The Dandelions of eastern North America consist of the common weeds, dominant and aggressive species difficult to eradicate and, like the majority of our weeds, brought recently from Europe; and a series of indigenous species which, for the most part, are local and non-aggressive, confined to strictly natural habitats of Labrador, Newfoundland, the Mingan Islands, Anticosti and Gaspé, only very rarely extending westward in

Quebec or southward into the Maritime Provinces and New England. The problem of working out the identities of the native species is difficult. The treatment of the genus by Handel-Mazzetti, *Monographie der Gattung Taraxacum* (1907), conservative, and very detailed for Europe and adjacent Asia, recognizes scores of local species there but, exclusive of the very distinct *T. mexicanum* DC., admits absolutely no endemic North American *Taraxaca* and, outside the two introduced species, cites for all temperate and boreal North America only 89 collections. As a sound basis for orientation Handel-Mazzetti's work is invaluable, but for detailed understanding of the genus in North America it is, obviously, unsatisfactory.

The only special study of the genus in North America is Sherff's *North American Species of Taraxacum*.[1] This paper was based upon study of much borrowed herbarium material; but, apparently, the author had had little, if any, intimate field-experience with native American *Taraxaca*. It is difficult for one who has watched, collected and studied the native species of Gaspé, western Newfoundland and Labrador through a period of thirty years to reach the conclusion of Sherff, that *T. lapponicum* Kihlm., with involucral bracts unappendaged and with the achenes (PLATE 271, FIG. 10) muricate only at the summit, is identical with *T. ceratophorum* (Ledeb.) DC. (PLATE 271, FIGS. 1–4), which has corniculate-appendaged bracts and the achenes muricate their whole length. Only by "lumping" very dissimilar plants as an "Herba valde polymorpha," to use Sherff's first descriptive phrase, could such a conclusion be reached. If *T. lapponicum*, *T. lacerum* Greene and *T. ceratophorum* are identical, the question naturally arises, why are not they further merged with *T. lyratum* (Ledeb.) DC.? The character relied upon in Sherff's key to distinguish *T. lyratum* ("Achaenia matura nigrescentia") is, to be sure, one upon which Handel-Mazzetti had placed confidence, but it is most difficult to find any emphatic color-difference in the achenes of *T. lyratum* and of *T. phymatocarpum* Vahl (which Sherff, unjustifiably, it seems to me, merges with it) and in those of many mature collections of *T. lapponicum* and other species which Sherff merges with *T. ceratophorum*. In *T. lyratum*, however, the slender achene (PLATE 272, FIG. 4) is very finely muriculate only at summit; in *T. phymatocarpum* (PLATE 272, FIGS. 1–3) the stouter achene is coarsely muricate its whole length. I am, therefore, after collecting (or being associated

[1] Sherff, Bot. Gaz. lxx. 329–359, plates 31–33 (1920).

with the collecting of) nearly 150 numbers of indigenous *Taraxaca* and after watching their behavior in the field and observing the essential constancy of their technical characters, quite as unable to follow Sherff in his wholesale reduction of species as I am to subscribe to the wholesale multiplication of micro-species, *formae*, *biotypes* or *jordanons* as "species," at present so much in vogue in northern Europe.

The most fundamental character in *Taraxacum*, it seems to me, is in the mature achene, whether tuberculate its entire length or only at summit, whether with a slender or thick pyramid, and, lastly, whether rufescent or drab. The color is less satisfactory than the other characters, since it often changes as the fruit matures. The length of the filiform beak in mature fruit is, also, a very satisfactory character. Consequently, for really satisfactory study, *ripe fruit* is essential. Much immature or merely flowering material can be placed only approximately. The characters of the involucre are next in importance, whether with many or with few or no bracts corniculate. The leaf-base furnishes important characters. In our introduced species the leaf usually narrows below to a definite petiole; in most of the natives it is broad at base or broadly margined.

On these characters, which seem to be very real, our *Taraxaca* in northeastern America (exclusive of Greenland and the Arctic) seem to fall into 11 species, as follows:

a. Mature achenes mostly tuberculate nearly or quite to the base; the tubercles, at least of the upper half, closely crowded; the surface of the achene without broad and plane intermediate areas....*b*.

b. Beak of achene only 2.5–5 mm. long: involucre blackish, 1–1.4 cm. high, with 10–12 inner bracts: leaves 2–8 cm. long, 3–8 mm. wide, oblanceolate, entire, dentate or sinuate: scapes commonly only 2–9 cm. long.........1. *T. phymatocarpum*.

b. Beak 6–17 mm. long: involucre green, purplish or livid, 1.2–3 cm. high, with 10–25 inner bracts: leaves mostly larger: scapes mostly taller....*c*.

c. Many of the involucral bracts with a conspicuous corniculate appendage or knob below the tip; the outer bracts short and appressed or, if elongate and recurving, definitely broader than the inner.

Inner bracts 1.2–2 cm. long; their tips unappendaged or with appendages rarely if ever much exceeding or overtopping the bract-tips; outer calyculate bracts tightly appressed to and much shorter than the inner, firm, often with a conspicuous white scarious border: beak of fruit 6–14 mm. long.........2. *T. ceratophorum*.

Inner bracts 2–2.6 cm. long; their tips mostly with coarse appendages much longer than and often overtopping the bract-tips; outer calyculate bracts ⅔ as long as the inner, finally loosely spreading or recurving, herbaceous, without broad margin: beak of fruit 13–17 mm. long...................3. *T. laurentianum*.

c. Most or all of the involucral bracts with plane and unappendaged tips; outer bracts thin and herbaceous, when strongly recurving scarcely or but slightly broader than the inner.

All or nearly all the leaves with broad bases; their margins shallowly dentate to sinuate-lobed, the teeth and lobes mostly entire: inner involucre 1.3–2 cm. high, during anthesis with bracts separated to within 1 or 2 mm. of the base; their herbaceous central portion 1–3 mm. wide, with scarious margin 0.2–1. mm. broad at base: achenes pale-brown or reddish, narrowly oblanceolate, 3.8–4.5 mm. long (excluding the pyramid): beak 6–9 mm. long . . . . 4. *T. ambigens.*

All or nearly all the leaves tapering below to slender petioles; their margins with mostly sharply toothed deltoid lobes or teeth: inner involucres 1.5–2.7 cm. high, during anthesis with the bracts united at base for 3–6 mm.; their herbaceous central portion 1.6–4 mm. wide, with white scarious margin 1.3–1.5 mm. broad at base: achenes olivaceous, gray or fuscous, cuneate 2.8–3.8 mm. long (excluding the pyramid): beak 9–12 mm. long . . . . 5. *T. latilobum.*

a. Mature achenes tuberculate only above the middle or, if occasionally toward the base, the tubercles remote and with broad plane intermediate areas or bands. . . . *d*

d. All or at least many of the involucral bracts corniculate-appendaged . . . . *e.*

e. Achenes grayish, drab, pale-brown or olivaceous; pappus bright white: upper faces of ligules orange-yellow: leaves dentate, shallowly sinuate or deeply lobed.

Leaves linear-oblanceolate, subentire, dentate or sinuate, if sinuate or dissected with mostly entire narrowly deltoid lobes: outer calyculate bracts of involucre closely appressed or barely spreading: pyramid of fruit stout, one-half to quite as broad as long; beak of fruit 5.5–8.5 mm. long . . . . 6. *T. lacerum.*

Leaves narrowly obovate-lanceolate or broadly oblanceolate, deeply sinuate, with the linear-caudate lobes lacerate at the deltoid base and with shorter intermediate narrow lobes: outer calyculate bracts loosely spreading, recurving at maturity: pyramid slender, 3–4 times as long as broad; beak 10–13 mm. long . . . . 7. *T. Longii.*

e. Achenes red or reddish-purple: pappus creamy or sordid: upper faces of ligules sulphur-yellow: leaves mostly dissected nearly or quite to the midrib . . . . 8. *T. laevigatum.*

d. All or nearly all the involucral bracts unappendaged . . . *f.*

f. Achene subtruncate or strongly rounded below the short pyramid: the upper third of each rib with 4 or more sharp murications; pyramid 0.3–1 mm. long.

Leaves usually narrowed below to a slender scarcely winged petiolar base; at least the lower and longer marginal lobes toothed and with frequent intermediate small teeth: achenes (excluding the slender pyramid) 2–4 mm. long, drab or olivaceous . . . . . . 9. *T. palustre.*

Leaves mostly broad at base or with broadly winged petiole; marginal lobes entire or with few teeth; intermediate teeth few or none: achenes (excluding pyramid) 3.5–5 mm. long, olivaceous to fulvous . . . 10. *T. lapponicum.*

f. Achenes attenuate into the long pyramid, smooth throughout or with 1–3 murications at the summit of each angle; pyramid 1.5–2 mm. long............11. *T. torngatense.*

1. T. PHYMATOCARPUM Vahl in Hornem. Fl. Dan. xiii. fasc. xxxix. 6, t. mmcclxxxxviii. fig. 12 (1860); Handel-Mazzetti, Mon. Gat. Tarax. 58, tt. II. fig. 8 and IV. fig. 12 (1907). *T. lyratum* Sherff, Bot. Gaz. lxx. 332 (1920), in part, not DC. (including t. xxxi. fig. g).—Arctic America and arctic eastern Asia; with us known only from NEWFOUNDLAND: dry limestone crest of northern half of Burnt Cape, Pistolet Bay, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss*, no. 29,254. See p. 121. PLATE 272, FIGS. 1–3.

Taraxacum phymatocarpum, with the very closely allied, if not inseparable, *T. hyparcticum* and *T. pumilum* Dahlst., is a typical high-arctic plant, characterized by its vary small heads, with black involucre of few bracts, its short and stout, very strongly muricate, fuscous achene and its very short beak. The recent collections from Labrador, made by my students and others under my direction who have made a specialty of collecting *Taraxacum, Arnica, Antennaria, Euphrasia* and other critical genera, contain none of it, though it is to be expected in northernmost Labrador. As already stated, I am unable to follow Sherff in reducing *T. phymatocarpum* to *T. lyratum* (Led.) DC. *T. lyratum* came originally from the region of Behring Straits ("*in lapidosis summae alpis ad. fl. Tschuja contra ostium fl. Tschegan*") and its habit was beautifully shown in Ledebour's plate. Material in the Gray Herbarium from Arakamtchetchene Island (*C. Wright* in Herb. U. S. No. Pacif. Expl. Exped.) is from close by and is quite like Ledebour's original plate. This is the plant of arctic Northwestern America which extends southward as an alpine species to Arizona. Its very distinctive achene is shown in PLATE 272, FIG. 4.

In view of the concentration in the North of *Taraxacum lyratum* and *T. phymatocarpum* and their allies, it is peculiarly notable that the subantarctic species, the so-called § *Taraxaca antarctica* of Handel-Mazzetti (*T. magellanicum* Commerson and *T. melanocarpum* and *T. cygnorum* Handel-Mazzetti) of Chile, South Australia, New Zealand and Chatham Island, should be so close to *T. phymatocarpum.* For comments on this bipolar relationship in *Lesquerella, Antennaria* and in many other groups see pp. 269 and 335.

2. T. CERATOPHORUM (Led.) DC. Prodr. vii[1]. 146 (1838); Handel-Mazzetti, l. c. 62, in large part, t. II. fig. 11 (1907); Sherff, l. c. 338, in small part (1920). *Leontodon ceratophorus* Led. Icon. Pl. Fl. Ross. i. 9, t. 34 (1829). *T. vulgare*, var. *ceratophorum* (Led.) Trautv. Pl. Sib. 76 (1877), name only.—A wide-ranging boreal species, known in

our area only from Labrador, western Newfoundland and southeastern Quebec. LABRADOR: rock-crevices, Rock Island, 15 miles nw. of Ford Harbor, *Harlow Bishop*, no. 606a; base of cliff, Dead Islands, lat. 52° 48′, *J. A. Allen*, no. 59. NEWFOUNDLAND: crevices of trap cliffs, Sacred Island, Straits of Belle Isle, *Fernald & Long*, no. 29,239; mossy and turfy trap cliffs and talus, Anse aux Sauvages, Pistolet Bay, *Fernald, Wiegand & Long*, no. 29,240; shelves, crests and talus of diorite cliffs, Ha-Ha Point, *Fernald & Long*, no. 29,238; turfy or gravelly shelves, crests or talus of diorite, Ha-Ha Mountain, *Pease & Griscom*, nos. 29,241, 29,242; springy meadow at base of Ha-Ha Mt., *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,262; turfy limestone barrens, Cook Point, Pistolet Bay, *Fernald & Gilbert*, no. 29,237 (broad-leaved form); sandy and turfy upper border of limestone beach, Cook Point, *Fernald & Gilbert*, no. 29,243 (dwarf form, distributed as *T. groenlandicum*); dripping limestone ledges, Cook Point, *Fernald, Gilbert & Hotchkiss*, no. 29,264; turfy or peaty pockets in limestone ledges, Sandy (or Poverty) Cove, *Fernald, Long & Dunbar*, no. 27,171; turfy borders of limestone beach, Gargamelle Cove, Ingornachoix Bay, *Fernald, Long & Fogg*, no. 2172. QUEBEC: limestone shingle, crest (625 ft.) of Les Murailles, Percé, August 17, 1904, *Collins, Fernald & Pease;* gravelly banks of Grand River, Gaspé Co., June 30–July 3, 1904, *Fernald;* calcareous cliffs and talus, Gros Morne, Gaspé Co., *Fernald & Weatherby*, no. 2482; summit of talus and bases of calcareous cliffs west of Rivière aux Marsouins, Gaspé Co., *Fernald & Weatherby*, no. 2477; limestone and limestone-conglomerate ridges from Pointe aux Corbeaux to Cap Caribou, Bic, *Fernald & Collins*, no. 1210; rock-crevices, Cap Orignal, Bic, *Fernald & Collins*, no. 792, *Rousseau*, no. 26,708; Pointe sud-ouest du Cap Orignal, Bic, *Rousseau*, nos. 31,004, 31,006. PLATE 271, FIGS. 1–4.

As American *Taraxacum ceratophorum* I have taken the plant which seems nearest to match the highly conventionalized plate of Ledebour. Much material quite unlike it has been thrust into *T. ceratophorum* by Sherff; but, without a more extended study of species proposed by Greene, Rydberg and others in western North America, I am not prepared to state the exact range of *T. ceratophorum* in the West. Good material from the Cascade Range in British Columbia is shown by sheets from Mt. McLean, near Lillooet, July, 1916, *J. M. Macoun*, nos. 98, 693 and 98,696; and Dr. Raup has brought back many numbers from northern British Columbia. The most extreme plant related to *T. ceratophorum*, in having copiously tuberculate achenes and conspicuously appendaged involucral bracts, is a species of shores of the Gulf of St. Lawrence which has sometimes been distributed as *T. ceratophorum*, more often as *T. dumetorum* Greene; but, since Greene explicitly states that his *T. dumetorum* has the "achenes

. . . spinulose at summit, otherwise smooth," it is not satisfactory to place the plant of the Gulf of St. Lawrence with it. Some other characters are evident on comparing the Rocky Mountain plant which I take to be *T. dumetorum*. It has a smaller head (the inner involucre 1.5–2 cm., in the Laurentian plant 2–2.6 cm. high; its outer bracts are shorter and very scarious or broadly scarious-margined, the long outer bracts of the Laurentian plant herbaceous. Its achenes (PLATE 272, FIG. 10), as already stated, are smooth below, and its mature beak 7–8 mm. long; the Laurentian plant having the larger mature achenes rough throughout and with beaks 13–17 mm. long. I am therefore proposing the latter as

3. T. **laurentianum**, sp. nov. (TAB. 272, FIGS. 5–9), planta robusta; foliis oblanceolatis tenuibus 1–3 dm. longis 2–5 cm. latis, basi late marginatis, marginibus duplo dentatis, dentibus longioribus argutis lanceolatis vel anguste deltoideis 0.3–1.3 cm. longis; scapo crasso 1–3.5 dm. alto; capitulis magnis; bracteis exterioribus herbaceis viridibus vel purpurascentibus late lanceolatis vel anguste ovatis 1.5–2 cm. longis 4–8 mm. latis adscendentibus deinde patentibus vel recurvatis apice planis vel valde corniculatis, corniculis bracteae apicem valde superantibus; bracteis interioribus 18–25 lineari-lanceolatis 2–2.6 cm. longis valde corniculatis, corniculis ovatis bracteae apicem majoribus; ligulis croceis dorso fuscis; achaeniis griseo-olivaceis cuneato-oblongis 3.2–4 mm. longis apice acute muricatis basin versus obtuse muriculatis; pyramide subulata 1.2–2 mm. longa; rostro 13–17 mm. longo; pappo 7–10 mm. longo gilvo-lacteo.—Western Newfoundland and eastern Quebec. NEWFOUNDLAND: springy meadow at base of Ha-Ha Mountain, Ha-Ha Bay, July 17, 1925, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,245, TYPE in Gray Herb. (distributed as *T. ceratophorum*); turfy spots on slaty calcareous talus, Cutwater Head, Bay of Islands, July 16, 1929, *Fernald, Long & Fogg*, no. 2174; turfy spots on slaty calcareous talus, Cod Cove, Bay of Islands, July 16, 1929, no. 2175. QUEBEC: sur les calcaires, Ile St.-Charles, Archipel de Mingan, 26 juillet 1924, *Victorin & Rolland*, no. 18,396 (as *T. ceratophorum*), 20 juillet 1926, no. 25,181; sur les calcaires du côté sud, Ile à la Chasse, Mingan, 26 juillet 1924, no. 18,397; cailloutis calcaires, Grande Ile à Bouleau, Mingan, 29 juillet 1926, no. 25,178; sur le sable de goulet, Rivière la Loutre (Est), Anticosti, 3 août 1927, *Victorin & Rolland*, no. 27,559. See pp. 50, 51.

Taraxacum laurentianum is the eastern American counterpart of the northern Skandinavian *T. Hjeltii* Dahlst. That, however, has the inner involucre only 1.7–2 cm. long, the outer bracts with white scarious margin, the pyramid at most 0.75 mm. long and the beak at most 1 cm. long. Its relationship to the western American *T. dumetorum* has been noted. The large collections of the latter brought back

from Alberta and British Columbia by Dr. H. M. Raup greatly reinforce my opinion that it is a very definite western American species.[1]

4. T. **ambigens**, sp. nov. (TAB. 271, FIGS. 5–8), planta subgracilis; foliis oblanceolatis tenuibus 0.3–3 dm. longis 1–3 (–6) cm. latis basi late marginatis, marginibus dentatis vel sinuatis, lobis horizontaliter divergentibus vel refractis triangularibus plerumque integris 0.3–1.5 cm. longis; scapo 0.4–6 dm. alto; capitulis mediocribus; bracteis exterioribus herbaceis lineari-lanceolatis 0.8–1.3 cm. longis 1.5–3 mm. latis, reflexis apice plerumque planis; bracteis interioribus 10–20 lineari-lanceolatis 1.1–1.9 cm. longis apice planis; ligulis croceis; achaeniis pallide brunneis vel rufescentibus anguste oblanceolatis 3.8–4.5 mm. longis apice acute muricatis basin versus obtuse muriculatis; pyramide 0.5–1 mm. longa; rostro 6–9 mm. longo; pappo 5–8 mm. longo lacteo.—Southern Labrador, western Newfoundland and eastern Quebec. LABRADOR: springy banks and damp hillsides, Forteau, July 30, 1910, *Fernald & Wiegand*, no. 4210. NEWFOUNDLAND: swales and wet peaty limestone barrens, Capstan Point, Flower Cove, July 27, 1924, *Fernald, Long & Dunbar*, no. 27,175 (as *T. latilobum*); shaded base of limestone sea-cliff, Port au Choix, July 27, 1929, *Fernald, Long & Fogg*, no. 2167 (TYPE in Gray Herb.); turfy limestone shore, Sandy Cove, Ingornachoix Bay, August 9, 1924, *Fernald, Long & Dunbar*, no. 27,177 (as *T. latilobum*); calcareous cliffs, Steady Brook Falls, lower Humber Valley, July 16, 1910, *Fernald & Wiegand*, no. 4209 (as *T. ceratophorum*). QUEBEC: limestone and calcareous sandstone terraces, Blanc Sablon ("Labrador"), July 30, 1910, *Fernald & Wiegand*, no. 4211 (as *T. ceratophorum*); damp ledges and alluvium, R. Ste. Anne des Monts, August 3–17, 1905, *Collins & Fernald* (as *T. ceratophorum*); wet calcareous ledges, Grand Cascapedia R., July 12–15, 1905, *Williams, Collins & Fernald* (as *T. ceratophorum*).

Var. **fultior**, var. nov. (TAB. 271, FIG. 9), bracteis exterioribus ovatis vel ovato-lanceolatis 5–8 mm. longis 2.5–4 mm. latis erectis.—NEWFOUNDLAND: turfy limestone slopes east of Big Brook, Straits of Belle Isle, July 16, 1925, *Fernald, Wiegand & Hotchkiss*, no. 29,260 (as *T. ceratophorum*); turfy talus of limestone headland, Gargamelle Cove, Ingornachoix Bay, July 20, 1929, *Fernald, Long & Fogg*, no. 2163 (TYPE in Gray Herb.). QUEBEC: mossy meadows at 455 m. (1500 ft.) to 915 m. (3000 ft.), Fernald Basin, between Mts. Mattaouisse and Fortin, July 22, 1922, *Fernald & Pease*, no. 25,342 (as *T. ceratophorum*, altered to *T. lapponicum*), July 8, 1923, *Fernald, Griscom, Mackenzie, Pease & Smith*, no. 26,116 (as *T. ceratophorum*, altered to *T. lapponicum*).

[1] Just as this discussion of *Taraxacum* is to be paged, beautiful material of *T. dumetorum* from within the area here covered comes to hand: from shaded cliffs, Northern Slate Island, Thunder Bay District, Ontario, July 6, 1933, *A. S. Pease & R. C. Bean*, no. 23,576. Its characters are discussed in the treatment of *T. ceratophorum*.

Taraxacum ambigens, as clearly indicated in the citations, has been confused with *T. ceratophorum, T. lapponicum* and *T. latilobum.* In foliage it is very like the first two and quite unlike *T. latilobum,* which has the slender-petioled leaves copiously double-dentate. The involucre is essentially that of *T. lapponicum* and without the corniculate appendages and the firm and white-bordered outer bracts of *T. ceratophorum;* but the achenes in all mature heads are copiously tuberculate or muriculate to the base, as in both *T. latilobum* (PLATE 273, FIG. 5) and *T. ceratophorum* (PLATE 271, FIG. 4). This series has been a constant source of perplexity, thrown first into one species because of the involucre, then into another because of the leaves and, again, into a third because of the achenes. With *T. ambigens* taken out, the entanglement which has confused the identities of *T. ceratophorum* and *T. lapponicum* in eastern America is removed. That *Taraxacum ambigens* is not a hybrid of *T. lapponicum* and *T. ceratophorum* is quite clear. At only 1 of the 16 stations for the latter has *T. ambigens* been found, although these areas have all been closely scrutinized for all *Taraxaca. T. ambigens* may eventually have to be reduced to one of the Cordilleran species of Greene, Rydberg or Nelson. Its strongly muricate achenes seem to keep it apart; but a number of their proposed species were based on very young material of which ripe achenes were unknown.

5. T. LATILOBUM DC. Prodr. vii[1]. 146 (1848). *Leontodon latilobum* (DC.) Britton in Britt. & Brown, Ill. Fl. ed. 2, iii. 315, fig. 4063 (1913).—Newfoundland to New England. NEWFOUNDLAND: without definite locality, 1826, *La Pylaie* in herb. DC. (TYPE), tracing in Gray Herb.; turfy limestone shore, St. Barbe, *Fernald, Long & Dunbar,* no. 27,176; grassland, Old Port au Choix, *Fernald, Long & Fogg,* no. 2159. QUEBEC: calcareous cliffs and talus, Gros Morne, Gaspé Co., *Fernald & Weatherby,* nos. 2479–2481; grès schisteux, Tourelle, *Rousseau,* no. 31,145. MAINE: gravelly thicket, Orono, *Fernald,* no. 2397 (as *T. officinale*); rocky slope, Dennysville, *Fernald & Weatherby,* no. 2483; damp soil, Cutler, July 2, 1902, *Kennedy, Williams, Collins & Fernald.* MASSACHUSETTS: low woodland dump, Beverly Farms, June 23, 1913, *F. T. Hubbard;* Lanesboro, July 17, 1917, *J. R. Churchill.*

Taraxacum latilobum has the aspect of very broad-leaved *T. palustre,* var. *vulgare* (*T. vulgare* (Lam.) Schrank, *T. officinale* Weber) but its achenes (PLATE 273, FIG. 5) are very strongly muriculate quite to the base as in *T. ceratophorum.* The abundantly naturalized European species, to which Handel-Mazzetti and others have referred *T. latilobum* has, as they describe them, the achenes tuberculate at sum-

mit, "parte superiore (¼ usque ½ fere) tuberculis largis brevioribus longioribusve obsita"—*Handel-Mazetti*. *T. latilobum* is apparently indigenous from Newfoundland and Gaspé to central and eastern Maine, but at its Massachusetts stations it seems like an introduction.

6. T. lacerum Greene, Pittonia, iv. 230 (1901). *T. ceratophorum* Liebm. & Lange, Fl. Dan. xv. fasc. xlv. 7, t. mmdclix. (1861), not DC. *T. mutilum* Greene, l. c. 232 (1901); *T. groenlandicum* Dahlst. Arkiv. Bot. v. no. 9: 23, tt. 14 and 15 (1906). *T. arctogenum* Dahlst. l. c. 26, t. 16 (1906).—Greenland and Arctic America, south to Labrador, northwestern Newfoundland and the Mingan Islands, Quebec, and in the West to the Rocky Mts. in the upper Peace River region. Labrador: near mouth of stream emptying into south side of East Bay, Ikordlearsuk, lat. 59° 57′, *Abbe & Odell*, nos. 593, 594; moist meadowy hillside, Near Island, Seven Islands Bay, Kangalaksiorvik, lat. 59° 25′, *Abbe*, no. 595: top of ridge, north of harbor, Razorback Harbor, lat. 59° 14′, *Abbe*, no. 596; moist gully in cliff on north side of Razorback Harbor, *Abbe*, no. 597; gravelly beach, Mouth of Frazer River, lat. 57°, *Harlow Bishop*, no. 606; Nain, *C. S. Sewall*, no. 142; hill back of Mission Park, Hopedale, lat. 55° 27′, *Abbe & Hogg*, no. 592. Ungava: Ungava River, *Spreadborough*, no. 14,395 (as *T. ceratophorum*). Newfoundland: dry limestone barrens, northern half of Burnt Cape, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss*, no. 29,254*a*; dry gravelly limestone barrens, St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,266. Quebec: sur les calcaires, Ile Quin, Archipel de Mingan, *Victorin & Rolland*, nos. 18,398, 18,399.

Taraxacum lacerum, originally described (in 1901) from the Upper Liard in northern British Columbia, was collected in the same general area (on Mt. Selwyn) in great diversity of numbers by Dr. Hugh M. Raup and his companions in 1932. Dr. Raup's very full material shows every transition to Greene's *T. mutilum* (1901) from Alaska and it is quite inseparable from the Greenland, Labrador and Newfoundland specimens which Dahlstedt has identified as his own *T. groenlandicum* (1906). I am, furthermore, unable to find satisfactory distinctions to separate *T. arctogenum* (1906), a co-type of which is in the Gray Herbarium. Dahlstedt, in publishing *T. groenlandicum*, cited material from Melville Peninsula. It is in the Herbarium of the Carnegie Museum from Southampton Island; and in the Gray Herbarium from Dawson Trail, Yukon (*Tyrrell*, no. 23,101), Herschell Island, Yukon (*Frits Johansen*, no. 98,717) and Point Barrow, Alaska (*Murdock*). The species is, then, widely dispersed in Arctic America,

with extensions south to the Gulf of St. Lawrence and to the northern Rocky Mts.

7. T. **Longii,** sp. nov. (TAB. 273, FIGS. 1–4), planta subgracilis; foliis anguste obovato-lanceolatis vel late oblanceolatis valde laciniato-sinuatis 1–1.5 dm. longis 3–5 cm. latis, lobis lineari-caudatis ad basin versus deltoideis laceratis; scapo 0.9–2 dm. longo; capitulis magnis; bracteis exterioribus ovatis vel oblongis purpureo-tinctis 6–10 mm. longis 3–5 mm. latis apice plus minusve corniculatis in calathio erectis deinde laxe patentibus vel recurvantibus; bracteis interioribus 10–12 lanceolatis 1.6–2.4 cm. longis cornubus parvis plerumque praeditis; ligulis croceis; achaeniis griseo-olivaceis vel pallide brunneis oblanceolatis 3.5–4 mm. longis apice acute muricatis basin versus planis; pyramide subulata 1.2–1.5 mm. longa; rostro 1–1.3 cm. longo; pappo 7–8 mm. longo albo.—Northwestern Newfoundland and southeastern Quebec. NEWFOUNDLAND: springy meadow at base of Ha-Ha Mountain, Ha-Ha Bay, *Fernald, Wiegand, Long, Gilbert & Hotchkiss,* no. 29,244, as *T. lacerum* (TYPE in Gray Herb.); turfy crests of limestone ledges, Flower Cove, *Fernald, Long & Dunbar,* no. 27,170 (as *T. lacerum*). QUEBEC: limestone gravel, banks of Grand River, Gaspé Co., June 30–July 3, 1904, *Fernald* (as *T. dumetorum*).

Taraxacum Longii is one of the complex group of which *T. ceratophorum* is the type. From that species, as here interpreted, it differs in its doubly incised-dentate leaves, the recurving, broader and more herbaceous outer bracts, the tiny appendages of the inner bracts and the achenes smooth below the summit. From *T. lacerum,* to which it was previously referred, by its broader and doubly incised leaves and the more herbaceous and soon reflexing outer bracts. From *T. dumetorum* it is at once distinguished by its very characteristic leaf, by the herbaceous (rather than scarious) and more appendaged, shorter outer bracts, by the fewer inner bracts and by the longer pyramid of the fruit. *T. Longii* is related to *T. macroceras* Dahlst. of Siberia, but that has the outer bracts appressed and with much longer horns, the inner narrower than in *T. Longii,* and the fulvous achenes with a very short (0.5 mm. long) pyramid. The only other species to which *T. Longii* seems to approach is *T. norvegicum* Dahlst.; but that has a shorter involucre, with much narrower bracts, the outer appressed, the pyramid short and the beak at most 6 mm. long.

8. T. LAEVIGATUM (Willd.) DC. Cat. Hort. Monspel. 149 (1813); Handel-Mazzetti, l. c. 109, t. III. fig. 11 (1907); Sherff, l. c. 356 (1920). *Leontodon laevigatus* Willd. Sp. Pl. iii. 1546 (1800). *T. erythrospermum* Andrz. in Bess. Enum. 75 (1822); Fernald, Bot. Gaz. xx. 323 (1895). *L. erythrospermum* (Andrz.) Eichw. Naturhist. Skizze Litth. Volhyn. 150 (1830); Britton in Britt. & Brown, Ill. Fl. ed. 2, iii. 316, fig. 4064

(1913).—Dryish open soil, southern Quebec to southern British Columbia, south to Virginia, Missouri and New Mexico (acc. to *Sherff*); naturalized from Europe. First collected in America, apparently, in 1886; now widely dispersed.

9. T. palustre (Lyons) Lam. & DC. Outer bracts of involucre ovate to oblong-lanceolate, erect, finally loosely spreading.—Fl. Franç. iv. 45 (1805), in part, but including name-bringing synonym, not *T. palustre* (Ehrh.) Dahlst. Bot. Not. 1905: 145 (1905) and Arkiv. Bot. vii. no. 6: 8 (1908). *Leontodon palustre* Lyons, Fasc. Pl. 48 (1763); Sm. Engl. Bot. viii. 553 (1799) and Fl. Brit. ii. 823 (1800). *L. Raji* Goüan, Ill. et Obs. Bot. 55 (1773). *L. Taraxacum, δ. palustre* (Lyons) Huds. Fl. Angl. ed. 2, i. 339 (1778). *T. officinale, β. palustre* (Lyons) St.-Amans, Fl. Agenaise, 324 (1821); Fernald, Rhodora, iv. 157 (1902). *L. Taraxacum palustris* (Lyons) Gaudin, Fl. Helv. v. 62 (1829). *T. officinarum, δ. palustre* (Lyons) Maly, Fl. Deutschl. 241 (1860).—Grasslands, especially damp or wet, or damp slopes, Newfoundland and Quebec to southern New England, rarely to Pennsylvania; naturalized from Europe. The earliest American collections seen were made in Vermont in 1896.

Var. **vulgare** (Lam.), comb. nov. Outer bracts linear or linear-lanceolate, strongly reflexed even in bud.—*Leontodon Taraxacum* L. Sp. Pl. ii. 798 (1753), in part; and many later authors. *L. vulqare* Lam. Fl. Franç. ii. 113 (1778). *T. officinale* Weber ex Wiggers, Prim. Pl. Holst. 56 (1780). *T. vulgare* (Lam.) Schrank, Prim. Fl. Salisburg, 193 (1792); Handel-Mazzetti, l. c. 88, t. III. fig. 2 (1907); Sherff, l. c. 350 (1920). *L. officinalis* (Weber) With. Arr. Brit. Pl. ed. 3, iii. 679 (1796), excl. var. *T. Dens-leonis* Desf. Fl. Ant. ii. 228 (1800). *L. Taraxacum, δ. vulgare* (Lam.) Benth. Cat. Pl. Indig. Pyr. Bas Langued. 94 (1826). *T. Dens-leonis*, var. *officinale* (Weber) Coss. & Germ. Fl. Env. Paris, ii. 432 (1845), as to name-bringing synonym. *T. Taraxacum* (L.) Karsten, Deutsch. Fl. 1138 (1880–83).—Grasslands and clearings, a ubiquitous and aggressive weed, Newfoundland to southern Alaska, south through much of the United States; naturalized during colonial days from Europe.

The necessity to reverse the names of our two large olive- or drab-fruited weedy Dandelions, one the ubiquitous weed with the outer bracts narrow and strongly recurved from the first, the other a weed of Newfoundland, eastern Canada and New England (rarely in Pennsylvania) with shorter and broader appressed or merely spreading outer bracts, is most disconcerting. It results, however, from the failure of those who have monographed our *Taraxaca* to trace the names involved to their ultimate sources. It is, to say the least, uncomfortable, in following the rules of Nomenclature now in vogue, to find one's self unwillingly appearing as an iconoclast, in changing to a very awkward combination the technical name of a cosmopolitan weed.

It is certainly to be hoped that a less cumbersome and more appropriate designation may eventually be found.

In the present case Handel-Mazzetti, in his *Monographie der Gattung Taraxacum* (1907), merged, as *T. paludosum* (Scop.) Schlechter (1866), the real *T. paludosum*, i. e. *Hedypnois paludosa* Scop. Fl. Carn. ii. 100, t. 48 (1772) and the wholly different *T. palustre* (Lyons) Lam. & DC. (1805). Handel-Mazzetti cited definitely in the synonymy of *T. paludosum* the *T. palustre* Lam. & DC. (1805), *Leontodon Taraxacum* var. *palustre* With. (1787) and *L. palustre* Smith (1800) and, as a plant intermediate between *T. vulgare* and *T. paludosum*, the *L. Taraxacum*, δ. *palustre* Hudson (1778)—the latter incorrectly cited by Handel-Mazzetti as a binomial ("*L. palustre* Hudson"), which Hudson did not make. Had he checked the citations, he would have detected that the original use of the name *T. palustre* was for a plant utterly unlike *T. paludosum*. Smith (1800), Withering (1787) and Hudson (1778), at the points cited by Handel-Mazzetti, all definitely carried the reference back to "*Lyons. Fasc.* 48"; but the failure of recent monographers to do so has caused the present upheaval in nomenclature.

Furthermore, this failure of European students of *Taraxacum* to follow *T. palustre* to its nomenclatural source has led to another confusion. Thus, the combination *T. palustre* was properly published in Flore Française, iv.45 (1805), where Lamarck & DeCandolle made the same confusion as did Handel-Mazzetti later of "*Leontodon palustre*. Smith, Fl. brit. 2. p. 823" and *Hedypnois paludosa* Scop. The circumstance, that Lamarck & DeCandolle had mixed elements, in no wise changes the fact that NOMENCLATURALLY their *T. palustre* (1805) rested upon its name-bringing synonym, *L. palustre* Sm. (1800), therefore, upon *L. palustre* Lyons (1763), the latter reference given without qualification by Smith as his source. Nevertheless, although the name *T. palustre* already had perfectly valid publication for one species (in 1805), we find the new combination, *T. palustre* (Ehrh.) Dahlstedt, Bot. Notiser, 1905: 145 (1905) and Arkiv Bot. vii. no. 6: 8 (1908), based on *Leontodon Taraxacum palustre* Ehrh. (1790), not *L. palustre* Lyons (1763) nor *L. Taraxacum*, δ. *palustre* (Lyons) Huds. (1778), put forward and now being used in Skandinavian literature for a species of another section!

Israel Lyons' account, in his *Fasciculus Plantarum circa Cantabrigiam Nascentium* (1763), was as follows:

89. Leontodon (*palustre*) calyce toto erecto glabro, scapo cavo unifloro.
Leontodon calyce toto erecto glabro, foliis longe ellipticis denticulatis. *Gmel. sib.* 2. 15 ?
Habitat *in palustribus,* on Hinton Moor, *primus observavit* D. Car. Miller.
Folia *radicalia oblonga, ad apicem latiora, acuta denticulata glabra, nervo medio rubro.* Scapus *teres cavus uniflorus.* Calyx *glaber imbricatus,* squamae *externae ovatae acutae margine submembranaceae erectae; internae lineares.* Receptaculum *nudum,* Pappus *pilosus denticulatus stipitatus.*

Lyons' *Leontodon palustre* was well characterized nine years earlier than *Hedypnois paludosa* Scop. and, were the two conspecific, Lyons' name would have to be taken up instead of that of Scopoli. The "Folia *radicalia oblonga, ad apicem latiora*" and the "squamae *externae ovatae acutae margine submembranaceae erectae*" of Lyons' description indicate, however, that he had the variation of the common dandelion of meadows, lawns and fields with short and appressed outer bracts, not the wholly different *T. paludosum* (Scop.) Schlechter, a plant with thick linear-oblanceolate mostly unlobed leaves only 3–10 mm. wide, small heads with white-margined outer bracts, pale flowers and large achenes (5 mm. long) with very long pyramids. Smith, Engl. Bot. viii. t. 553 (1799), published a good plate of Lyons' species, after studying plants "raised from seed sent from Cambridgeshire" (the type-region). This plate and a number of sheets of specimens collected in England as *T. palustre* seem to leave no question that the common weed with linear or lanceolate strongly recurving outer bracts, *Leontodon vulgare* Lam. (1778), *T. officinale* Weber (1780), *T. Dens-leonis* Desf. (1800), differs from *Leontodon palustre* Lyons (1763) only in that single fickle character and that, consequently, the earliest specific name, *palustre,* must be used for the aggregate-species.

One way out of this awkward situation would be to treat the two as different species, which I am unable to do, in view of the fact that I cannot consider them specifically distinct. The only other possible way to avoid taking up *T. palustre* for the common weed, which usually passes as *T. officinale* or as *T. vulgare,* is to recognize the "accidental binomial," "*Dens leonis vulgaris*" of Hill, Brit. Herb. 441 (1756). There are many very strong objections to such a course. In the first place, Hill was not regularly using binomials; all other plants enumerated on the page, as well as on the preceding page, had polynomials. Furthermore, the double generic name *Dens leonis* is wholly irregular and it is quite possible to view *Dens leonis vulgaris* as a trinomial.

To save the long-established name, *T. vulgare*, by going back to Hill for its justification does not seem the proper course. Either horn of the dilemma is unsatisfactory, but the cause of sound nomenclature, so long as the existing rules are in force, calls, unhappily, for the taking up of *T. palustre* (Lyons) Lam. & DC. for the less common weed of Europe and America; and *T. palustre*, var. *vulgare* for the superabundant weed of fields and lawns. Under the constructive and conservative (therefore discarded) "Kew Rule" this change would have been unnecessary.

If we could see with the eyes of some Scandinavian and English botanists, we should recognize in *Taraxacum palustre* many scores of species. Every slight divergence in the cutting of the leaves or the color of the corollas or the shade of the achenes would become a "species," and the weeding of a village park would yield at least a dozen of them. Personally, I can match the specimens on the lawn outside my window with authentic sheets of ten of Dahlstedt's "specific" propositions. Sound taxonomy demands good balance; if specific values are universally reduced to the point of absurdity the old and honored science of taxonomy will be doomed. The argument that, because often parthenogenetic, therefore vegetatively reproducing, these divergencies or biotypes in *Taraxacum* are self-perpetuating, could be applied equally to any vegetatively reproduced garden sport. Genetically they are not species nor anything but trivial variations which, under normal sexual reproduction, would quickly be lost in a common blend. They are no more species than are the color-forms of many garden flowers or the variously colored garden forms of cereals. Unless the *Taraxaca* have very real and deep-seated differences of involucre, flower and fruit and definite geographic segregation, it seems like stultification of science to treat them as species. We must not ignore the facts that all plastic and modern species consist of innumerable minor trends, but that these slight tendencies are utterly different from the true ("Linnean") species which, through millions of years, have stood the long test of competition and physiographic change. Call the minor variants *jordanons*, if you will, or the good and more generally used *formae* or the more modern *biotypes* but keep the good old term SPECIES for SPECIES. Shifting of meaning does not clarify terminology.

10. T. LAPPONICUM Kihlman, Meddel. Soc. Faun. Fl. Fenn. xi. 108 (1884); Handel-Mazzetti, l. c. 73 (1907), in part. *T. croceum* Dahlst.

in Anderss. & Hesselmen, Bih. K. Svenska Vet.-Ak. Hdlg. xxvi³. No. 1: 12 (1900).—Arctic and subarctic Eurasia and North America, south with us to Newfoundland and eastern Quebec. Labrador: Port Burwell, *Ralph Robinson*, no. 69; granitic rock, at Head of Main Arm of Ekortiarsuk Bay, *Woodworth*, nos. 441, 445; ridge (ca. 320 m.) extending south from East Bay, Ikordlearsuk, lat. 59° 55′, *Abbe & Odell*, nos. 585; on granitic rock, North Shore of Duck Bight, 1 km. n. of Ryan's Bay, *Woodworth*, no. 437; granitic rock under 760 m., Razorback Mt., Ryan's Bay, *Woodworth*, no. 439; tundra above the anchorage, Ryan's Bay, lat. 59° 35′, *Abbe & Odell*, nos. 588, 589; dry gravelly slopes, Near Island, Seven Islands Bay, Kangalaksiorvik, lat. 59° 18′, *Abbe*, no. 591; valley of Komaktorvik R., lat. 59° 15′, *Abbe*, no. 587; moist gully in cliff on north side of Razorback Harbor, lat. 59° 14′, *Abbe*, nos. 582, 584, 590; granitic cliffs, Head of Nachvak Bay, *Woodworth*, no. 438; Rama, *Sornberger*, nos. 64, 64x; granitic rock, Kikkertasoak Island, Saglek Bay, *Woodworth*, no. 436; Ogualik Island, lat. 57° 56′, *E. D. Brooks, jr.*, no. 586; lower ridge (ca. 595 m.) east of The Valley of the Twin Falls, Cape Mugford Peninsula, lat. 57° 50′, *Abbe*, no. 581; gravelly moraine, Mouth of Frazer R., lat. 57°, *Harlow Bishop*, no. 604; Anatolak, *C. S. Sewall*, nos. 334, 336; Titterasuk, *Sewall*, no. 12; wet spruce woods, Nain, lat. 56° 33′, *Sewall*, no. 66, *Harlow Bishop*, no. 605; Hopedale, *Sewall*, no. 176; "The Park," Hopedale, *Abbe, Hogg, & Forbes*, nos. 579, 580; Battle Harbor, *Sewall*, no. 193. Newfoundland: swaley cleft in bare rock, top of Fishing Head, St. Anthony, *Abbe*, no. 577; peaty and turfy brookside, Quirpon Island, *Fernald & Long*, no. 29,258; springy slopes and brooksides at head of Mauve (or Noddy) Bay, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,259; mossy brooksides and damp turfy slopes, Sacred Island, *Fernald & Long*, no. 29,253; turfy limestone barrens, northern half of Burnt Cape, Pistolet Bay, *Fernald et al.*, nos. 29,250, 29,261 (as *T. ceratophorum*); turfy limestone barrens, Cook Point, *Fernald & Gilbert*, no. 29,251; turfy limestone slopes, Big Brook, Straits of Belle Isle, *Fernald & Long*, nos. 29,247, 29,257, *Fernald, Wiegand & Hotchkiss*, nos. 29,248, 29,249, 29,265; turfy slope by sea, Four-Mile Cove, Straits of Belle Isle, *Fernald, Wiegand & Long*, no. 29,263; turfy or peaty limestone barrens, Sandy (or Poverty) Cove, Straits of Belle Isle, *Fernald, Long & Dunbar*, no. 27,174, *Fernald & Griscom*, no. 29,256 (distributed as *T. groenlandicum*); mossy glades back of Savage Cove, *Fernald & Long*, no. 29,246; swales and peaty limestone barrens, Capstan Point, Flower Cove, *Fernald, Long & Dunbar*, no. 27,172; turfy limestone headlands and shores south of Flower Cove, *Pease, Long & Gilbert*, no. 29,255 as *T. ceratophorum* (2 or 3 bracts corniculate, but involucre otherwise of *T. lapponicum* and achenes of the latter); dripping quartzite cliffs and ledges, upper Deer Pond Brook, Highlands of St. John, *Fernald & Long*, no. 29,252; springy meadow on quartzite slope near head of Yellow Brook, Doctor Hill, *Fernald, Long & Fogg*, no. 2108; turf overlying limestone, Grassy

Island, St. John Bay, *Fernald, Long & Fogg*, no. 2173; turfy talus of limestone sea-cliffs, Eastern Point, St. John Bay, *Fernald, Long & Fogg*, nos. 2161, 2162, 2166; turfy talus of limestone sea-cliffs or on limestone barrens, Pointe Riche, *Fernald, Long & Fogg*, nos. 2164, 2165, 2171; dry peaty limestone barrens, Gargamelle Cove, *Fernald, Long & Fogg*, no. 2162; turfy spots on slaty calcareous talus, Cod Cove and Cutwater Head, Bay of Islands, *Fernald, Long & Fogg*, nos. 2169, 2170. QUEBEC: gravelly thicket back of strand, Bradore, *Fernald & Wiegand*, no. 4212 (as *T. ceratophorum*); grassy hillside, Rivière à la Truite and grassy bank, Pointe Jones, Brest, *St. John*, nos. 90,790, 90,791; sur les platières, R. du Brick, Anticosti, *Victorin & Rolland*, no. 27,552; au pied du grand Cap à l'embouchure, R. Vaureal, Anticosti, no. 27,553; sur les platières argilo-calcaires, R. Chicotte, Anticosti, no. 27,556; dans la prairie sur le plateau, Pointe du Sud-Ouest, Anticosti, no. 27,557; sur les rivages calcaires, R. de la Chute, Anticosti, no. 27,558; calcareous alpine meadow, alt. 1000–1125 m., Table-top Mts., *Fernald & Collins*, no. 789 (as *T. ceratophorum*); canyon humide, cirque nord-est, Botanist Dome, Mt. de le Table, *Rousseau & Fortier*, no. 31,500; by alpine brooks or in wet crevices of hornblende schist, alt. 600–1075 m., Mt. Albert, *Fernald & Collins*, nos. 263, 785 (as *T. ceratophorum*); sur les schistes hornblendiques et les paragneiss, alt. 1000 m., Lac du Ruisseau du Plaque-Malade, Mt. Albert, *Victorin, Rolland, Brunel & Rousseau*, no. 17,537; subalpine meadows (alt. 850–880 m.) Fernald Pass, between Mts. Mattaouisse and Fortin, *Fernald, Griscom & Mackenzie*, no. 26,117 (as *T. ceratophorum*); banks of Grand River, Gaspé Co., June 20–July 10, 1903, *G. H. Richards*, June 30–July 3, 1904, *Fernald;* wet red sandstone bluffs and steep slopes, between Baldé and the Baie des Chaleurs, Bonaventure River, August, 1904, *Collins, Fernald & Pease;* damp ledges and cliffs between the Forks and Brûlé Brook, Little Cascapedia R., July, 1904, *Collins, Fernald & Pease*. PLATE 271, FIG. 10.

It is probable that several of the plants described from the Rocky Mts. by Greene, Rydberg and others belong to *Taraxacum lapponicum*. Without better fruit than they described the proper disposition of these species must await fuller collections.

11. T. **torngatense**, sp. nov. (TAB. 273, FIGS. 6–9). Planta gracilis; foliis tenuibus lineari-oblanceolatis 0.5–1.8 dm. longis 1–2.5 cm. latis, basi longe-petiolatis, margine lobis oblique deltoideis integris; scapo 0.7–1.5 dm. longo; capitulis mediocribus; bracteis exterioribus fuscescentibus lanceolatis 5–8 mm. longis erectis vel subpatentibus apice planis; bracteis interioribus 12–15 lineari-lanceolatis 13–16 mm. longis apice planis vel rariter subcorniculatis; achaeniis cinnamomeis vel rufescentibus anguste fusiformibus 4–4.5 mm. longis apice ad pyramide attenuatis emuricatis vel rariter submuricatis; pyramide subulata 1.5–2 mm. longa; rostro 5–6 mm. longo; pappo albido 5–6 mm. longo. NORTHERN LABRADOR: granite rock, North Shore of

Duck Bight, 1 km. north of Ryan's Bay, August 24, 1926, *R. H. Woodworth*, no. 446 (as *T. ceratophorum*); granitic rock under 760 m., Razorback Mt., Ryan's Bay, August 23, 1926, *Woodworth*, no. 444; granitic cliffs at 150–600 m., Head of Nachvak Bay, August 17, 1926, *Woodworth*, no. 443 (TYPE in Gray Herb.).

Taraxacum torngatense is proposed with some hesitation. Superficially it is suggestive of the most attenuate states of *T. lapponicum*, but the very attenuate and almost to quite smooth achenes and the very long pyramid seem to set it off very definitely from its allies. Much fuller material, especially in ripe fruit, is needed. Writing of the type-number in a letter of November 14, 1927, Dahlstedt said: "Undoubtedly a good new species, very well characterized through the almost smooth reddish-brown fruits."

(*To be continued.*)

ARISTIDA LONGESPICA IN CONNECTICUT.—In RHODORA XXXV. 318 (Sept. 1930) Prof. Fernald pointed out that the New England plant passing as *Aristida longespica* Poir. (*A. gracilis* Ell.) is not the typical form of that species but the more northern var. *geniculata* (Raf.) Fern. At the time his paper was written, he had seen no specimens of the typical form from any point north of southeastern Pennsylvania. Since then, however, there has come to the Gray Herbarium a specimen collected by R. W. Woodward in "dry soil, Plain Road," Franklin, Connecticut, which Prof. Fernald determines as typical *A. longespica*,—the range of which is accordingly to be extended to eastern Connecticut.—C. A. WEATHERBY, Gray Herbarium.

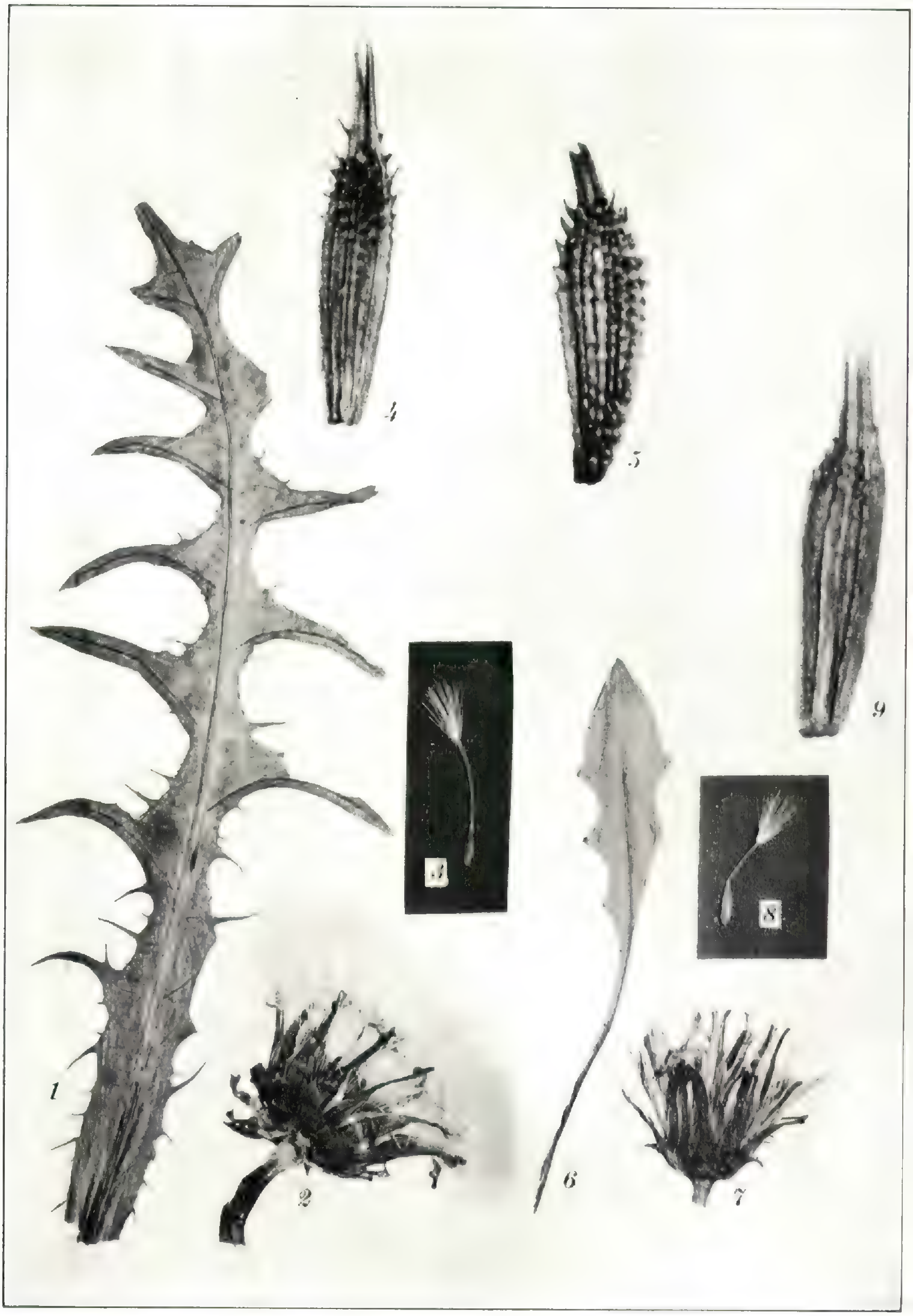
Volume 35, no. 418, including pages 323–350 and 6 plates. was issued 7 October, 1933.

TARAXACUM PHYMATOCARPUM: FIG. 1, plant, × 1, from Greenland; FIG. 2, achene, with characteristic short beak and remnant of pappus, × 1, from Greenland; FIG. 3, achene, × 10.

T. LYRATUM: FIG. 4, achene, × 10, from Colorado.

T. LAURENTIANUM: FIG. 5, leaf, × 1, from the TYPE, Ha-Ha Bay, Newfoundland; FIGS. 6 and 7, heads, × 1, from the TYPE; FIG. 8, achene, with long beak and long pappus, × 1, from the TYPE; FIG. 9, achene, × 10, from the TYPE.

T. DUMETORUM: FIG. 10, achene, × 10, from Alberta.



Taraxacum Longii: fig. 1, leaf, × 1, from Grand River, Quebec; fig. 2, head, × 1, from the type, Ha-Ha Bay, Newfoundland; fig. 3, achene, with beak and pappus, × 1, from the type; fig. 4, achene, × 10, from the type.

T. latilobum: fig. 5, achene, × 10, from Newfoundland.

T. torngatense: fig. 6, leaf, × 1, from the type, Head of Nachvak Bay, Labrador; fig. 7, head, × 1, from the type; fig. 8, achene, with beak and pappus, × 1, from the type; fig. 9, achene, × 10, from the type.

C 16 1933

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB

Conducted and published for the Club, by

MERRITT LYNDON FERNALD, Editor-in-Chief

JAMES FRANKLIN COLLINS
CHARLES ALFRED WEATHERBY } Associate Editors
LUDLOW GRISCOM

Vol. 35. December, 1933. No. 420.

CONTENTS:

Notes from Herbarium of University of Wisconsin—X.
N. C. Fassett 387

On Polysiphonia fibrillosa in New England. *R. E. Schuh* 391

The Type of Teucrium canadense. *M. L. Fernald* 392

Recent Discoveries in the Newfoundland Flora (concluded).
M. L. Fernald 395

Branching Polygonatum pubescence.
M. L. Fernald and S. K. Harris 403

Errata 406

Index to Volume 35 407

The New England Botanical Club, Inc

8 and 10 West King St., Lancaster, Pa.

Room 1001, 53 State St., Boston, Mass.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price, $2.00 per year, net, postpaid, in funds payable at par in United States currency in Boston; single copies (if available) 20 cents. Volumes 1–8 or some single numbers from them can be supplied only at advanced prices which will be furnished on application. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be considered for publication to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than two pages of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

M. L. FERNALD, 14 Hawthorn Street, Cambridge, Mass.

Subscriptions (making *all remittances* payable to RHODORA) to
Ludlow Griscom, 8 W. King St., Lancaster, Pa., or Museum of Comparative Zoology, Cambridge, Mass.

Entered at Lancaster, Pa. Post Office as Second Class Mail Matter.

INTELLIGENCER PRINTING COMPANY

Specialists in Scientific and Technical Publications

EIGHT WEST KING ST., LANCASTER, PA.

CARD-INDEX OF NEW GENERA, SPECIES AND VARIETIES OF AMERICAN PLANTS, 1885 TO DATE.

For American taxonomists and all students of American plants the most important supplement to the Index Kewensis, this catalogue in several ways exceeds the latter work in detail, since it lists not only the flowering plants, but ferns and other vascular cryptogams, and includes not merely genera and species, but likewise subspecies, varieties and forms. A work of reference invaluable for larger herbaria, leading libraries, academies of sciences, and other centers of botanical activity. Issued quarterly, at $22.50 per 1000 cards.

GRAY HERBARIUM of Harvard University,
Cambridge, Mass., U. S. A.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. Day. Leatherette. Pocket size. Invaluable for collector's memoranda and herbarium records. Published and sold by the Gray Herbarium, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

MEMOIRS OF THE GRAY HERBARIUM. A series of illustrated quarto papers issued at irregular intervals, sold separately.

No. III. The Linear-leaved North American Species of Potamogeton, Section Axillares, by M. L. Fernald. 183 pp., 40 plates, 31 maps. 1932. $3.00.

Gray Herbarium of Harvard University, Cambridge, Mass.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3/4 in. 1 year $4.00, 6 months $2.50.

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 35. December, 1933. No. 420.

NOTES FROM THE HERBARIUM OF THE UNIVERSITY OF WISCONSIN—X[1]

NORMAN C. FASSETT

THAT part of Ontario between the Ottawa River and Sault Ste. Marie, including the north shore of Lake Huron and the vicinity of Georgian Bay, seems to have been botanized less extensively than its interesting flora would warrant. The following rather disjointed notes are the results of several trips by automobile, when it was seldom possible to collect at any great distance from the highways. The writer is indebted to the late Dr. M. O. Malte for much information concerning the known ranges of these plants in Canada, and especially to Mr. C. A. Weatherby for his kindly help in identifying much of the material.

Twelve miles east of Sault Ste. Marie the highway skirts for some distance a long, south-facing cliff, with well-developed talus. On this cliff, near Garden River, was collected *Woodsia Cathcartiana*, while in near-by woods was found *Osmorhiza divaricata*. The latter proves to be a not uncommon species in the upper Great Lakes area, having been found by the writer at Port Wing, Wisconsin, in great profusion in the Porcupine Mountains near Ontonagon, Michigan, on Manitoulin Island and on Bruce Peninsula.

The many small lakes between Sault Ste. Marie and Espanola are mostly rocky-shored, with small sandy beaches. Many of the plants are obviously of eastern derivation; these include *Elatine minima*, *Juncus pelocarpus* and *Eriocaulon septangulare*.

[1] Published with aid of a grant to RHODORA from the National Academy of Sciences.

Manitoulin Island may be approached from the north by a road from Espanola, which traverses a rugged and barren region of igneous and metamorphic rocks—"rough, tough and terrible," to quote a resident. Coincident with reaching the Lake Huron shore, on Cloche Peninsula, the highway abruptly emerges on a level limestone plain. There are but a few decimeters of soil, or in many places no soil at all, with vegetation occurring only in crevices in the rock. Here, on the dry barrens or margins of pools, are such characteristic plants of the Great Lakes as *Eleocharis pauciflora*, *Rynchospora capillacea* var. *leviseta*, *Hypericum Kalmianum*, *Primula intercedens*, and *Sisyrinchium montanum*. Here, with the Arctic *Carex scirpoidea*, are several plants apparently not hitherto reported from so far north in Ontario: *Geum triflorum*, *Linum sulcatum*, *Rhus canadensis*, and *Liatris cylindracea* (also reported from La Cloche Island).[1] Here was collected a mint which may be described as:

Isanthus brachiatus (L.) BSP., var. **linearis**, n. var., caule simplice, 7–10 cm. alto, gracillimo; foliis superioribus linearibus, 1–1.7 mm. latis, 1-nerviis; calicibus minus glandulosis quam apud formam typicam, florentibus 3 mm. longis, fructiferis 4 mm. longis; bracteolis calycibus proximis.—Stem simple, 7–10 cm. high, very slender; upper leaves linear, 1–1.7 mm. wide, 1-nerved; lower leaves unknown; calyx less glandular than in the typical form, 3 mm. long in flower, 4 mm. in fruit; floral bracts closely subtending the calyx.—Dry limestone flats, Cloche Peninsula, Ontario, August 20, 1932, *N. C. Fassett*, no. 14770 (type in Herb. Univ. of Wis.).

In aspect this little plant scarcely suggests *Isanthus brachiatus*, but its floral structure indicates that it is but a dwarfed northern extreme of that species.

In a lake on Great Cloche Island was found a plant differing from *Potamogeton Robbinsii* in lacking the ordinarily very characteristic minute serrulation of the leaves; its uniform occurrence in certain localities would indicate that it is more than a sporadic abnormality. It was found by two different collectors in different years in one lake in Wisconsin. The writer collected it at Mattawa, Ontario, in 1931, and in 1932 found it abundant at the same locality, although not *in situ*, for the water was high and only floating plants were collected. Besides occurring on Great Cloche Island, it has been collected on Cockburn Island, also in northern Lake Huron. The indication is that it replaces typical *P. Robbinsii* on many of these places, but, on the other hand, both types have been collected in Lake Maxinkuckee,

[1] Macoun, Cat. Can. Pl. ii. 207 (1884).

Indiana. The only real intermediate seen is from Togue Pond, near Mt. Katahdin, Maine, collected by A. H. Norton on July 28, 1923; this has some of the leaves serrulate and some entire. Many specimens which at first appear to have entire leaves prove otherwise when examined with transmitted light under a binocular microscope.

POTAMOGETON ROBBINSII Oakes, f. **cultellatus**, n. f., marginibus foliorum non serratis, firmis, stramineis, nitentibus.—WISCONSIN: Bond Lake, Gordon, September 14, 1930, *W. T. McLaughlin*, no. 13081; Bond Lake, Gordon, July 9, 1931, *J. H. Steenis*, no. 1369. MICHIGAN: Liver Light Lakes, Iron County, September, 1922, *F. P. Metcalf*, no. 2232.[1] INDIANA: Lake Maxinkuckee, 1904, *J. T. Scovell*, no. 29.[2, 2] OHIO: Sandusky Bay ["Sand Bay" on the label; Dr. Pieters writes me that this was an abbreviation for Sandusky Bay], August 31, 1898, *A. J. Pieters*.[2] ONTARIO: Cockburn Island, Lake Huron, *J. Bell* in 1860;[3] shallow water of Helen Lake (or Lewis Lake), Great Cloche Island, August 20, 1932, *N. C. Fassett*, no. 14806 (TYPE in Herb. Univ. of Wis.); shallow water, Mattawa, July 4, 1931, *Fassett*, no. 13325; floating in the Mattawa River, Mattawa, September 9, 1932, *Fassett*, no. 14805. CONNECTICUT: Hamlen's Pond, Plainville, July 29, 1901, *C. H. Bissell*.

Manitoulin Island, in the northern part of Lake Huron, is 80 miles long, and has on it many small shallow lakes. The most conspicuous topographic feature is a limestone cliff along the northern side; this is the escarpment of the Niagara limestone, which also makes up the backbone of Door County, Wisconsin, and of the Bruce Peninsula, Ontario. This escarpment appears like a promising territory for a botanist, but fires have been so devastating that most of the cliffs and talus slopes have become too dry to support much vegetation. A collector who could take the time to find moist sheltered places would probably discover much of interest. Visiting a talus slope near High Hill, Excelsior, on August 21, 1932, the writer collected a *Woodsia* of the puzzling *oregana* group, which superficially resembled *W. Cathcartiana*, but differed from that species in having the margins of the pinnules jagged and glandular; in this it matched a specimen of *W. mexicana* collected by Wooton & Standley, in the White Mountains, Lincoln County, New Mexico, August 25, 1907.

On the Lake Huron shore, about eight miles west of Little Current, on Manitoulin Island, was collected *Bidens frondosa* var. *anomala*,

[1] Specimen in the United States National Herbarium; the writer is indebted to Dr. Maxon for the loan, and to Mr. Neil Hotchkiss for examining and selecting this material.

[2] Specimen in the Gray Herbarium, the writer is indebted to Professor Fernald and Mr. Weatherby for selecting and loaning this material.

new to Ontario and apparently not previously known from the shores of the Great Lakes except at the eastern end of Lake Ontario.

Bruce Peninsula has long been known as the home of some remarkable plants.[1] Here, as on Manitoulin Island, fire has done much damage. On a cool damp cliff at Barrow Bay the writer collected *Draba cana*, new to Ontario and not recorded in Gray's Manual as occurring between Vermont and the Rocky Mountains, while in moist woods near-by was found *Epilobium paniculatum*, which has been reported by Macoun from Bruce Peninsula. On talus slopes and stony beaches *Geranium Robertianum* is perhaps the most abundant plant. *Arenaria serpyllifolia* is so universally present on the escarpment of the Niagara limestone, is in such undisturbed habitats and in company with so many native species that it is hard to believe that it is an adventitious plant. It has been collected by the writer on the escarpment at the following places: Fish Creek, Wisconsin, in company with a *Draba* as yet unidentified; Pickford, Michigan, with *Asplenium viride* and *Polystichum Lonchitis;* near High Hill, Excelsior, Manitoulin Island, with the *Woodsia* just mentioned; Barrow Bay, Bruce Peninsula, with *Draba cana.*

Lake Nipissing is 50 miles northeast of Georgian Bay, and lies in the channel of one of the outlets of the Algonquin Great Lakes. Here were found two plants of some interest.

LATHYRUS JAPONICUS Willd., var. **parviflorus**, n. var., caulibus gracilibus, glabris vel pilosis in angulis; floribus 12–14.5 mm. longis; calicibus 7–8 mm. longis; leguminibus 3.8–4.8 cm. longis, chartaceis; seminibus 3.5–4 mm. diametro.—ONTARIO: sandy shore of Lake Nipissing, North Bay, July 3, 1931, *N. C. Fassett*, no. 13485 (TYPE in Herb. Univ. of Wis.); same station, plant with mature pods, September 10, 1932, *Fassett*, no. 14768; Lighthouse Point, on the southeast shore of Lake Nipissing, September 10, 1932, *Fassett*, no. 12952; Waltonian Lodge, on the southeast shore of Lake Nipissing, September 10, 1932, *Fassett*, no. 14769.

This beach pea, apparently isolated on the shores of Lake Nipissing since the time when that lake was a part of the outlet of the glacial Great Lakes, is slightly more slender than are the common plants of marine and Great Lakes beaches, has a much smaller flower, and a legume with much thinner and more papery walls. Moreover, the fruits and seeds at their largest development scarcely equal the smallest to be found on the more widespread varieties. In the type collec-

[1] See Mem. Am. Acad. Arts & Sci. xv. 256 (1925).

tion the flowers are nearly white, but the plants collected at the same station fourteen months later show normally colored flowers.

The pubescent variety of beach pea (*L. japonicus* var. *pellitus*), so abundant on the north Atlantic coast, is but sparsely represented about the Great Lakes, there being no material in the Gray Herbarium from inland stations.[1] Of the 42 sheets of *L. japonicus* from the Great Lakes region in the Herbarium of the University of Wisconsin, but two can be definitely referred to var. *pellitus;* these are: Washington Island, Door County, Wisconsin, July 22, 1926, *A. M. Fuller*, no. 1522; Manistique, Michigan, July 1, 1931, *N. C. Fassett*, no. 13482.

The recent changes in the nomenclature of the beach pea are here followed, although the writer is of the opinion that *Lathyrus japonicus* vs. *L. maritimus*, following *Quercus borealis* vs. *Q. rubra*, *Juncus macer* vs. *J. tenuis*, *Solidago flexuosa* vs. *S. latifolia*, and *Acer Treleaseanum* vs. *A. saccharum*, should be the last straw on the back of the last objector to the conservation of specific names.

Bidens connata Muhl., var. **submutica**, n. var., aristis nullis vel rare 1–2, 0.25–1.00 mm. longis; foliis simplicibus, petiolatis, dentibus var. *petiolatam* vel var. *ambiversam* simulantibus.—Awns none or rarely 1–2 in number and 0.25–1.00 mm. long; leaves simple, petioled, toothed as in var. *petiolata* or as in var. *ambiversa.*—Ontario: sandy shore of Lake Nipissing, North Bay, September 10, 1932, *Fassett*, no. 14775 (type in Herb. Univ. of Wis.); near Waltonian Lodge, southeast shore of Lake Nipissing, September 10, 1932, *Fassett*, nos. 14800, 14801, and 14802.

At Galetta, about 25 miles above Ottawa, the "Mississippi River" enters the Ottawa River. On the shore of the small stream, close to the highway, were collected *Typha angustifolia*, of which Dr. Malte wrote me that he had seen no specimens from above the Ottawa district, and *Juncus compressus*, of which he wrote me that he had seen no material from the Province of Ontario.

Madison, Wisconsin.

On Polysiphonia fibrillosa in New England.—It is well known that this species is common south of Cape Cod. But, when Farlow's *Marine Algae of New England* appeared in 1881, only one specimen of this alga had ever been found north of that famous barrier of marine life. This had been collected by Hooper at Lynn,

[1] Rhodora xxxiv. 184 (1932).

Massachusetts about the middle of the 19th century.[1] This was still the only record in 1900.[2] But after Collins had spent several years in the study of the algae of Casco Bay, Maine he discovered it in Quahaug Bay.[3]

On several occasions I have found it here in sterile and depauperate forms. But on June 20, 1933, I collected fruited specimens in a sunny and protected bay, on *Zostera.* This is probably almost, if not quite, its eastern limit in the United States. South of the Cape it reaches a height of four to ten inches. Here most of the plants are but a few millimeters tall. The male plants especially are small and bear but one or two antheridia, and the female plants develop few or imperfect cystocarps. Every consideration indicates that this species was not evolved in our waters, but came to us from the Northeast Atlantic, where it abounds along the British Isles and western Europe.

One wonders whether it reached us during the mild climate of the Cretaceous, before the northern land bridge broke through in the Tertiary and allowed the cold waters of the Arctic Ocean to mingle with the waters of the north Atlantic and dominate its flora and climate. If so, why has it remained unchanged on each side of the Atlantic? Or, have there been subsequent migrations which have kept it true to type, despite the cold waters and other adverse influences encountered on the journey?

A slide has been placed in the National Herbarium.—R. E. Schuh, Brooklin, Maine.

THE TYPE OF TEUCRIUM CANADENSE[1]

M. L. Fernald

In 1901 the late Eugene P. Bicknell, one of the most observant of American amateurs, published his study of "The Genus Teucrium in the Eastern United States."[4] Bicknell there interpreted *Teucrium canadense* L. as the comparatively southern and inland plant with the "leaves rather thin, ovate to ovate-oblong or narrower, rounded or rarely subcordate at base, . . . 2.5–5 cm. wide, . . . above green and thinly appressed-hirsutulous to glabrate," a plant ranging

[1] W. H. Harvey, Nereis Boreali-Americana, Vol. II., p. 43. Washington, 1852.

[2] F. S. Collins, Rhodora, vol. 2, p. 51, Feb., 1900.

[3] F. S. Collins, Marine Algae of Casco Bay, p. 279, 1911. In Proceedings of Portland Society of Natural History. Vol. II., Part 9.

[4] Bicknell, Bull. Torr. Bot. Cl. xxviii. 166–172 (1901).

from "Western New England to Georgia and southern Texas, west to Arkansas."

At the same time he published as a new species, *T. littorale* Bickn. Bull. Torr. Bot. Cl. xxviii. 169 (1901), with "leaves thickish and rugose-veiny, narrowly oblong or sometimes broader, narrowed into the petiole, . . . 1.5–4 cm. wide," a coastal plant ranging from "Maine to Florida" and now well known from the coast of eastern Canada (Nova Scotia[1] and eastern New Brunswick[2]).

Subsequently I felt that, although well defined geographic or ecological varieties, the two plants described by Bicknell are hardly specifically separable and I, consequently, published the combination *T. canadense*, var. *littorale* (Bickn.) Fernald, RHODORA, x. 84 (1908). More recently, however, in view of the fact that the narrow- and rugose-leaved coastwise plant extends along the sandy outer coast of eastern Canada, a region whence specimens of many plants reached Europe in pre-Linnean times, it has seemed unlikely that Linnaeus had before him from "Canada" the plant which scarcely reaches so far north. The Linnean description of the plant he actually studied and clearly intended as *T. canadense* certainly applies to the coastwise plant, with its narrow leaves ("*Foliis gaudet angustioribus*"—Linnaeus) "rugose-veiny"—Bicknell ("*rugosis*"—Linnaeus). Bicknell, however, made a different decision, maintaining that Linnaeus rested the species primarily upon a reference to Tournefort, which Bicknell interpreted as referring to the plant of the interior with broad and thin non-rugose leaves.

In view of this difference of interpretation, it is important to have the Linnean account before us.

canadense 15. TEUCRIUM foliis ovato-lanceolatis serratis, caule erecto, racemo terminali, verticillis hexaphyllis.

Teucrium foliis lanceolatis serratis petiolatis, floribus solitariis. *Gron. virg.* 64.?

Chamaedrys canadensis, urticae folio subtus incano. *Tournef. inst.* 205.

Habitat in Canada. ♃

Planta *e* Canada *Foliis gaudet angustioribus, aequaliter serratis, subtus tomentosis, planis; Spica ex verticillis aut sparsis floribus bractea minima singulis subjecta; at* Hortensis *Foliis majoribus rugosis, inaequaliter serratis, vix subtus pubescentibus &* Floribus *in* Racemum *subspicatum ex verticillis sexfloris, hexaphyllis: bracteis serratis.*[3]

[1] Fernald, RHODORA, xxiii. 289 (1922).

[2] Blake, RHODORA, xx. 106 (1918).

[3] L. Sp. Pl. ii. 564 (1753).

It is at once apparent that *T. canadense* rested upon a very full and original account of a plant studied by Linnaeus and seen by him in cultivation, a plant with "*Foliis angustioribus* [*i. e.* with leaves narrower than in the preceding species, *T. sibiricum* "foliis . . . ovatis"] . . . *majoribus rugosis*" and references to earlier writers whose species Linnaeus associated with his own: *Teucrium foliis lanceolatis* of Gronovius, about which Linnaeus expressed doubt; and the *Chamaedrys canadensis* of Tournefort, about which we know nothing more than the brief and quite indecisive phrase of Tournefort, fully quoted by Linnaeus.

In such a case as this, with Linnaeus clearly describing a plant which he personally studied, most taxonomists would not hesitate to accept the plant Linnaeus had before him as the type. This plant, preserved in the Linnean Herbarium at Burlington House, was studied in 1930 by Mr. Bayard Long and myself. It is the most typical form of *T. littorale* Bicknell. When Bicknell was studying the group the late Professor L. M. Underwood looked up at the British Museum the Gronovian plant which was doubtfully included by Linnaeus. That, too, was *T. littorale,* Bicknell reporting upon it as follows: "The specimen doubtfully cited by Linnaeus under his *T. Canadense* was, however, brought to light at the British Museum. It proved to be 'wholly unsatisfactory' and was regarded both by Mr. Britten [James Britten, then Keeper of the British Museum] and Professor Underwood as a pathological plant. However, from the careful notes and sketches of the leaves made by Professor Underwood I have little doubt that the specimen is actually our common coastwise plant."[1]

Bicknell, however, felt that the two plants which Linnaeus had himself studied were wholly secondary: the plant which he fully described and which rests in his herbarium; and the Clayton plant of Gronovius, which Linnaeus had previously studied. Consequently, he interpreted the Linnean species as resting primarily on the Tournefort reference, which Bicknell justly characterized as "unsatisfactory." If, however, we interpret the Linnean species, not by the plants he knew and studied, but, rather, by those he did not know, our interpretations must be, as Bicknell called his own interpretation in this case "not wholly free from uncertainty." As already stated, most botanists would interpret the Linnean *T. canadense* as the plant Linnaeus twice studied, the plant of eastern Canada which Bicknell called *T. littorale*.

[1] Bicknell, l. c. 167 (1901).

A most significant point in this connection is the fact that, immediately following his *Teucrium canadense* "*Foliis gaudet angustioribus . . . rugosis*," Linnaeus had a second species, *T. virginicum* "foliis ovatis," based on another of Clayton's specimens which Linnaeus had personally studied. This type of *T. virginicum* could not be found by Underwood but Bicknell's conclusion seems justified, that the description "allows scarcely a doubt" that it was the inland plant interpreted by Bicknell as *T. canadense*. Linnaeus would hardly have distinguished as two species (1) *T. canadense*, "*Foliis . . . angustioribus . . . rugosis*" from Canada, where the narrow- and rugose-leaved plant is well known and where the ovate-leaved plant is unknown, and (2) *T. virginicum* "foliis ovatis," if his *T. canadense* had had the leaves ovate. It is reasonably clear, then, that

TEUCRIUM CANADENSE L. Sp. Pl. ii. 564 (1753), as to plant described (supported by the type in the Linnean Herbarium) and as to the Gronovian plant (preserved in the Clayton Herbarium at the British Museum) is *T. littorale* Bicknell, Bull. Torr. Bot. Cl. xxviii. 169 (1901). *T. canadense*, var. *littorale* (Bickn.) Fernald, RHODORA, xxiii. 289 (1922).

The more southern and inland plant is

T. CANADENSE L., var. VIRGINICUM (L.) Eaton, Man. Bot. ed. 5: 415 (1829); Wood, Class-Bk. 285 (1845); Farwell, Papers Mich. Acad. Sci. i. 97 (1923). *T. virginicum* L. Sp. Pl. ii. 564 (1753). *T. canadense* Bicknell, Bull. Torr. Bot. Cl. xxviii. 168 (1901), not L. (1753).

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA

M. L. FERNALD

(*Concluded from page 386*)

ADDITIONAL NOTES

WHILE the preceding eleven instalments have been in the course of publication my attention has been called to necessary changes in nomenclature. Such as have come to attention follow, although it will doubtless be found that some earlier homonyms besides those already detected will necessitate further change. That is the inevitable result of the adoption of the "homonym rule" without any safeguarding.

CAREX INCURVA Lightf. On pages 56, 60 and 216 I made notes on *C. incurva* Lightf. (1777) and its var. *setina* Christ (1888), publishing

a map (MAP 4) of the range and a photograph (PLATE 247, FIG. 1) of the latter. Most unfortunately, however, strict priority in nomenclature forces us to abandon the perfectly familiar name *C. incurva* for a characteristic and notable species of bipolar distribution and to take up for it a name, *C. maritima*, which has been equally familiar as the apellation of one of the most definite species of a wholly different section of the genus.

Carex maritima Gunner, Fl. Norveg. ii. 131 (1772), not *C. maritima* O. F. Muell., Fl. Dan. iv. fasc. xii. 6, t. dcciii (1777), was briefly but clearly diagnosed and based on an earlier diagnosis and excellent analytical plate:

> CAREX (*maritima*) spica unica, subrotunda; glumis ovatis, brevissime aristatis. *Hall.* 1354? *Oed. dan.* VIII.
> Norv. *Fjaerestar.* Habitat in arena littorea norv. Oeder.

C. maritima Gunner, was, therefore, established chiefly on the species described, without binomial, and well illustrated by Oeder in Flora Danica, iii. fasc. viii. (pl. ccccxxxii):

> *Carex spica unica subrotunda, glumis ovatis, brevissime aristatis.* Hall. 1354?
> Locus. In arenosis maritimis Norvegiae.

Both Oeder and, after him, Gunner, thought that the seashore plant of Norway might be species no. 1354 of Haller, but both expressed doubt on that point. *C. maritima* Gunner must, therefore, rest upon the Norwegian plant actually illustrated. This is without question the later-described *C. incurva* Lightf.

The detection of the priority of *Carex maritima* Gunner (1772), a name not caught either in *Index Kewensis* or by Kükenthal, over *C. incurva* Lightf. (1777) and over the wholly different *C. maritima* O. F. Muell. (1777) was made by Kreczetowicz, who, in a study of *Carex incurva sensu Kuekenthal*,[1] correctly takes up *C. maritima* for *C. incurva* but, less correctly, it seems to me, splits *C. incurva*, upon characters which are not satisfactorily constant in the material before me, into several proposed species: *C. transmarina* V. Krecz. for the plant of Greenland, *C. orthocaula* V. Krecz. for that of the Bering sea area, *C. jucunda* V. Krecz. for that of Newfoundland, etc. *C. setina* (Christ) V. Krecz. is set up for the dwarf *C. incurva*, var. *setina* Christ; and Simmons's ecological state of *C. incurva*, with culms showing the inflation so frequent in submersed individuals of many species, *C. incurva* var. *inflata* Simmons, appears as a new species, *C.*

[1] V. Krecz. Bull. Jard. Bot. del'Acad. Sci. deL'Urss. xxx. 119–138 (1932).

psychroluta V. Krecz., without a single specific character stated and only the description of Simmons directly quoted: "rhizoma longum inter muscos in aqua libera natans, culmus erectus valde inflatus, spica subglobosa."

Although I find myself unable to follow Kreczetowicz in his over-splitting of *Carex maritima* and his specific segregation from the northern European plant of the material from Greenland, Newfoundland and other North American areas, there are some well-defined geographic varieties which, unfortunately, have to be called

CAREX MARITIMA Gunner, var. **setina** (Christ), comb. nov. *C. incurva*, var. *setina* Christ in Scheutz, Pl. Vasc. Jeniseens. 174 (1888)—Kongl. Svensk. Vet.-Akad. Handl. xxii. no. 10: 174 (1888). *C. setina* (Christ) V. Krecz. Bull. Jard. Bot. de l'Acad. Sci. de L'Urss, xxx. 136 (1932).

C. MARITIMA, var. **melanocystis** (Desv.), comb. nov. *C. melanocystis* Desv. in Gay, Hist. Bot. Chile, vi. 203, t. 73, fig. 5 (1853). *C. incurva*, var. *melanocystis* (Desv.) Kükenth. in Engler, Pflanzenr. iv.[20] 114 (1909).

C. MARITIMA, var. **misera** (Phil.), comb. nov. *C. misera* Phil. Florul. Atacam. 388 (1860). *C. melanocystis*, var. *misera* (Phil.) Kükenth. in Engler, Bot. Jahrb. xxvii. 499 (1899). *C. incurva*, var. *misera* (Phil.) Kükenth. in Engler, Pflanzenr. iv.[20] 114 (1909).

The coarse maritime species with spreading or pendulous pistillate spikes with very prolonged scales, *Carex maritima* O. F. Muell. Fl. Dan. iv. fasc. xii. 6, t. dcciii (1777), not Gunn. Fl. Norv. ii. 131 (1772), must, apparently, be called C. PALEACEA Wahlenb. Vet.-Akad. Nya Handl. Stockh. xxiv. 164 (1803). The plant of Scandinavia and Russia, typical *C. paleacea*, is comparatively low, with culms 1–5 dm. high ("20–50 cm. altus"—*Kükenthal;* "3–5"—*Lindmann;* but, as shown in the Gray Herbarium, sometimes only 1 dm. high); the American plant is more variable, ranging from 0.2–1 m. high. The leaves of European *C. paleacea* are accurately described by Kükenthal as "4–8 mm. lata"; but those of the larger American specimens are often 10–12 mm. broad. The European plant has the pistillate spikes "2–5 cm. longae" (*Kükenthal*); but in ours the length is 2–7 cm. In typical European *C. paleacea* the perigynium has a minute beak, barely 0.2 mm. long; the beak in the American series is distinctly longer, 0.3–0.5 mm. long. The plant of eastern America is, therefore, a well defined geographic variety which I am calling

CAREX PALEACEA Wahlenb., var. **transatlantica**, var. nov., culmis 0.2–1 m. altis; foliis 0.5–1.2 cm. latis; spicis femineis 2–7 cm. longis;

perigyniis valde rostratis, rostro 0.3–0.5 mm. longo.—Coast of Labrador to Massachusetts; shores of James Bay. TYPE: meadows and swamps in the slaty region, south and east of Bic, Quebec, July 17, 1907, *Fernald & Collins*, no. 930 (in Gray Herb.).

Carex maritima, var. *erectiuscula* Fern. RHODORA, ii. 170 (1900) seems to be a hybrid of *C. paleacea*, var. *transatlantica* and *C. salina*, var. *kattegatensis*. A plant of the shores of the White Sea in Russian Lapland seems well distinguished from typical *C. paleacea* by its browner and erect spikes. This is

C. PALEACEA, var. **brunnescens** (F. Nylander), comb. nov. *C. maritima*, var. *brunnescens* F. Nylander, Spic. Fl. Fenn. ii. 20 (1844).

CAREX VAHLII Schkuhr, var. **inferalpina** (Wahlenb.), comb. nov. *C. alpina*, var. *inferalpina* Wahlenb., Fl. Lapp. 241 (1812); Fernald, RHODORA, xxxv. 223, t. 248, figs. 3, 4, 8 and 9 (1933). *C. angarae* Steud. Syn. Cyp. 190 (1855). *C. alpina*, forma *inferalpina* (Wahlenb.) Kükenthal in Engler, Pflanzenr. iv.[20] 386 (1909).

C. VAHLII, var. **Stevenii** (Holm.), comb. nov. *C. alpina*, var. *Stevenii* Holm, Am. Journ. Sci. ser. 4, xvi. 21, 27 (1903); Fernald, l. c., figs. 5 and 10 (1933).

Unfortunately *Carex alpina* Swartz (1798), which I used in the earlier part of this paper, is invalidated, as Mr. Mackenzie points out to me, by the earlier *C. alpina* Schrank (1789) and another, *C. alpina* Honck. (1792). So far as I can yet determine, the earliest available specific name for our plant is *C. Vahlii* Schkuhr, Riedgr. i. 87, t. Gg. no. 94 (1801).

HABENARIA ORBICULATA (Pursh) Goldie.

The reference to *Habernaria orbiculata* (Pursh) Torr. on p. 240 should read *H. orbiculata* (Pursh) Goldie. The species rests nomenclaturally entirely on *Orchis orbiculata* Pursh. In publishing *H. macrophylla* Goldie, Edinb. Phil. Journ. vi. 331 (1822), its author made the transfer of *Orchis orbiculata* to *Habenaria*, saying of his new *H. macrophylla* "It must rank next to *Habenaria orbiculata* (*Orchis* of Pursh and Nuttall), having, like it, two plane, orbicular, approaching to elliptical, *leaves*, ... and which, in this plant, are four times as large as those of *H. orbiculata.*" Even though one may read into this comparison of the leaf-size the influence of Hooker's misidentification of *Orchis orbiculata* Pursh,[1] yet from a purely nomenclatural standpoint *H. orbiculata* rests alone upon the Pursh species, which is the plant we have recently been correctly calling by that name: "In the herbarium at Kew there is a specimen of *Habenaria*

[1] See Ames, RHODORA, viii. 2 (1906).

orbiculata which appears to be the type. On the reverse of the sheet on which it is mounted, in the upper left-hand corner, the name 'Fred Pursh' is written. Presumably, this specimen was obtained by Hooker when the Lambert collection was sold, as Lambert possessed Pursh's herbarium."[1]

EUPHRASIA STRICTA Host (see p. 306). Professor Wiegand kindly calls my attention to the fact that *E. stricta* Host, Fl. Austr. ii. 185 (1831) in antedated by *E. stricta* HBK. Nov. Gen. et Sp. ii. 333 (1818). The removal of the latter species long since from *Euphrasia*, made *E. stricta* Host available and valid under the International Rules until they were fundamentally (and, I believe, unwisely) altered in 1930. Under the present dispensation our plant should probably be called E. RIGIDULA Jord. Pug. Pl. Nov. 134 (1852).

EXPLANATION OF PLATES 232–273.

PLATES 232–238. Sufficiently explained in the legends.

PLATE 239. NANISM AT SEALEVEL IN WESTERN NEWFOUNDLAND: FIG. 1, SOLIDAGO MACROPHYLLA Pursh, var. THYRSOIDEA (E. Meyer) Fern., from Bard Harbor Hill, *Fernald et al.*, no. 29,103; FIG. 2, SENECIO PAUPERCULUS Michx., var. FIRMIFOLIUS Greenm., from Sandy (or Poverty) Cove, *Fernald, Long & Dunbar*, no. 27,164; FIG. 3, SAXIFRAGA OPPOSITIFOLIA L., from Flower Cove, *M. E. Priest;* FIG. 4, SAXIFRAGA CESPITOSA L., from Plum Point, Brig Bay, *Fernald, Long & Dunbar*, no. 26,743; FIG. 5, DRABA INCANA L., var. CONFUSA (Ehrh.) Poir., from Burnt Cape, *Fernald et al.*, no. 28,350; all × 1.

PLATE 240. NANISM AT SEALEVEL IN WESTERN NEWFOUNDLAND: FIG. 1, POTENTILLA FRUTICOSA L., from Port au Port Bay, *Fernald & Wiegand*, no. 3579; FIG. 2, POTENTILLA NIVEA L., var. MACROPHYLLA Ser., from St. John Island, *Fernald et al.*, no. 28,527; FIG. 3, LESQUERELLA PURSHII (Wats.) Fern., from Old Port au Choix, *Fernald, Long & Fogg*, no. 1724; FIG. 4, PLANTAGO JUNCOIDES Lam., var. GLAUCA (Hornem.) Fern., from St. John Island, *Fernald et al.*, no. 29,058; FIG. 5, POA ALPINA L., var. BREVIFOLIA Gaudin, from Savage Cove, *Fernald, Pease & Long*, no. 27,394; all × 1.

PLATE 241. MUHLENBERGIA UNIFLORA (Muhl.) Fern., var. TERRAE-NOVAE Fern.: FIG. 1, habit, × 1, from Grandy Brook, Newfoundland, *Fernald, Long & Fogg*, no. 101; FIG. 2, spikelet from no. 101, × 10. FESTUCA PROLIFERA (Piper) Fern., var. LASIOLEPIS Fern.: FIG. 3, plant, × 1, from TYPE collection, Stanleyville, Newfoundland, *Fernald, Long & Fogg*, no. 1236; FIG. 4, spikelet from TYPE, × 4.

PLATE 242. CATABROSA AQUATICA (L.) Beauv.: FIG. 1, panicle, × 1, from Lund, Sweden, *Nilsson;* FIG. 2. summit of culm, × 6. C. AQUATICA, var. LAURENTIANA Fern.: FIG. 3, panicle, × 1, from Southport, Prince Edward Island, *Fernald & St. John*, no. 6881; FIG. 4, summit of culm, × 6, from Port aux Basques, Newfoundland, *Fernald, Long & Dunbar*, no. 26,285. C. AQUATICA, var. UNIFLORA S. F. Gray: FIG. 5, panicle, × 1, from Valais, Switzerland, *Joad;* FIG. 6, summit of culm, × 6, from Upsala, Sweden, *Ahlberg;* FIG. 7, panicle, × 1, from Henry Lake, Fremont Co., Idaho, *Payson & Payson*, no. 2017; FIG. 8, summit of culm, × 6, from no. 2017.

PLATE 243. AGROPYRON TRACHYCAULUM (Link) Steud.: FIG. 1, inflorescence, × 1, from Fort Garland, Colorado, 1884, *Vasey*, TYPE collection of *A. tenerum* Vasey; FIG. 2, inflorescence, × 1, from Mt. Ste. Anne, Percé, Quebec, *Collins*

[1] Ames, orchidaceae, iv. 144 (1910).

& Fernald, no. 36; FIG. 3, internode of rachilla, × 10, from Rivière à Pierre, Quebec, *Fernald & Smith*, no. 25,465. A. TRACHYCAULUM, var. MAJUS (Vasey) Fern.: FIG. 4, mature (contracted) inflorescence, × 1, from Kearney, Nebraska, *Shear*, no. 272, TOPOTYPE of *A. pseudorepens* Scribn. & Smith; FIG. 5, young inflorescence, × 1, from Little River, Newfoundland, *Mackenzie & Griscom*, no. 11,178; FIG. 6, internodes of rachilla, × 10, from Grand Falls, Newfoundland, *Fernald & Wiegand*, no. 4686. A. TRACHYCAULUM, var. NOVAE-ANGLIAE (Scribn.) Fern.: FIG. 7, young inflorescence, × 1, from the type region, Willoughby Mt., Vermont, *E. F. Williams;* FIG. 8, ripe (contracted) inflorescence, × 1, from Newbury, Massachusetts, *A. A. Eaton;* FIG. 9, internodes of rachilla, × 10, from Willoughby, Vermont, *Eggleston*, no. 2177.

PLATE 244. AGROPYRON TRACHYCAULUM (Link) Steud., var. GLAUCUM (Pease & Moore) Malte: FIG. 1, inflorescence, × 1, from Kelly Point, Pembroke, Maine, *Fernald*, no. 1367, TYPE of the variety; FIG. 2, inflorescence, × 1, from Comox, Vancouver Island, British Columbia, *Malte*, no. 107,855, TYPE of var. *caerulescens* Malte; FIG. 3, inflorescence, × 1, from Victoria, British Columbia, *Malte*, no. 108,309, TYPE of var. *pilosiglume* Malte; FIG. 4, internode of rachilla and base of lemma, × 10, from TYPE. A. TRACHYCAULUM, var. UNILATERALE (Cassidy) Malte: FIG. 5, inflorescence, × 1, from Rivière au Saumon, Anticosti I., Quebec, *Victorin & Rolland*, no. 27,886; FIG. 6, inflorescence, × 1, from Dry Fork of Belt Creek, Montana, *Rydberg*, no. 3352; FIG. 7, internode of rachilla and base of lemma, × 10, from *Victorin & Rolland*, no. 27,886.

PLATE 245. Inflorescences, × 1, of, FIG. 1, AGROPYRON REPENS (L.) Beauv., from Sandy Bay, Quebec, *Fernald & Collins*, no. 385; FIG. 2, A. REPENS, forma ARISTATUM (Schum.) Holmb., from Manchester, Maine, *Scribner*, no. 22; FIG. 3, A. REPENS, var. SUBULATUM (Schreb.) Reichenb., from Shediac Cape, New Brunswick, *Hubbard*, no. 707; FIG. 4, var. SUBULATUM, forma VAILLANTIANUM (Wulf. & Schreb.) Fern., from Jamaica Plain, Massachusetts, *Faxon;* FIG. 5, A. PUNGENS (Pers.) R. & S., from Harwich, Massachusetts, *Fernald*, no. 16,251.

PLATE 246. AGROSTIS SCABRA Willd., var. SEPTENTRIONALIS Fern.: FIG. 1, portion of panicle, × 1, from Main River, Bonne Bay, Newfoundland, *Fernald & Long*, no. 1306; FIG. 2, mature spikelets, × 6, from no. 1306. A. HYEMALIS (Walt.) BSP. (*A. antecedens* Bickn.): FIG. 3, young panicle, × 1, from Telford, Pennsylvania, *Benner;* FIG. 4, expanded panicle, × 1, from Jamaica, Long Island, New York, *Bicknell;* FIG. 5, mature spikelets, × 6, from Wady Petra, Illinois, *V. H. Chase* in Kneucker, Gram. Exsicc. no. 569.

PLATE 247. FIG. 1, CAREX MARITIMA Gunn., var. SETINA (Christ) Fern. (*C. incurva* Lightf., var. *setina* Christ), × 1, from Gargamelle Cove, Newfoundland, *Fernald, Long & Fogg*, no. 1373. FIG. 2, C. LANGEANA Fern., × 1, from Gargamelle Cove, Newfoundland, *Fernald, Long & Fogg*, no. 1374.

PLATE 248. CAREX VAHLII Schkuhr (*C. alpina* Sw.): FIG. 1, inflorescence, × 3, from the Engadine, Graubünden, Switzerland, *Zahn*, no. 17; FIG. 6, perigynium of no. 17, × 6; FIG. 2, inflorescence, × 3, from Anse aux Sauvages, Newfoundland, *Fernald, Wiegand & Long*, no. 27,699; FIG. 7, perigynium of same, × 6. C. VAHLII, var. INFERALPINA (Wahlenb.) Fern.: FIG. 3, inflorescence, × 3, from Austria, *Arnell;* FIG. 8, perigynium, of same, × 6; FIG. 4, inflorescence, × 3, from North Fork of Madeleine River, Quebec, *Fernald, Dodge & Smith*, no. 25,549; FIG. 9, perigynium of same, × 6. C. VAHLII, var. STEVENII (Holm) Fern.: FIG. 5, inflorescence, × 3, from Estes Park, Colorado, *Hunnewell;* FIG. 10, perigynium of same, × 6. C. VESICARIA L., var. LAURENTIANA Fern.: FIG. 11, inflorescence, × 1, from Chevalier, Saguenay Co., Quebec, *St. John*, no. 90,279; FIG. 12, inflorescence, × 1, from the TYPE, Doctor Hill, Newfoundland, *Fernald, Long & Fogg*, no. 1474.

PLATE 249. JUNCUS TRIGLUMIS L.: FIG. 1, habit, × 1, from Vajoletthal, Tyrol, *A. S. Pease*, no. 13,386; FIG. 2, fruiting glomerule, × 6, from near Katon-Karagai, Prov. Semiplatinsk, western Siberia, July 29, 1928, *Krylov & Sergievskaja;* FIG. 3, seeds, × 12, from Val de Fain, Haut Engadin, Switzer-

land, August 10, 1868, *Shuttleworth*. J. ALBESCENS (Lange) Fern.: FIG. 4, habit, × 1, from St. John Island, St. John Bay, Newfoundland, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 27,787; FIG. 5, fruiting glomerule, × 6, from Capstan Point, Flower Cove, Newfoundland, *Fernald, Long & Dunbar*, no. 26,492; FIG. 6, seeds, × 12, from Rock Marsh, Flower Cove, Newfoundland, *Fernald, Long & Dunbar*, no. 26,494.

PLATE 250. CYPRIPEDIUM PARVIFLORUM Salisb., var. PLANIPETALUM Fern.: FIG. 1, large plant, × 1, from Old Port au Choix, Newfoundland, *Fernald, Long & Fogg*, no. 1533; FIG. 2, small plant, × 1, from TYPE collection, Savage Cove, Newfoundland, *Fernald & Long*, no. 27,851.

PLATE 251. HABENARIA STRAMINEA Fern.: FIG. 1, habit, × 1, from Pointe Riche, Newfoundland, *Fernald, Long & Fogg*, no. 1543; FIG. 2, flowers, × 6, from Burnt Cape, Pistolet Bay, Newfoundland, *Fernald, Wiegand, Pease, Long, Griscom, Gilbert & Hotchkiss*, no. 27,889. H. ALBIDA (L.) R. Br.; FIG. 3, flowers, × 6, from Glen Lochay, Killin, Tayside, Perthshire, Scotland, June 25, 1927, *Frank Morris*.

PLATE 252. HABENARIA HOOKERI Torr., var. ABBREVIATA Fern.: habit, × 1, from TYPE collection, Eastern Point, St. John Bay, Newfoundland, *Fernald, Long & Fogg*, no. 1553; flower, × 2, from TYPE (upper insert). H. HOOKERI: flower, × 2, from Wallingford, Vermont, *Kennedy*.

PLATE 253. MALAXIS BRACHYPODA (Gray) Fern.: FIG. 1, habit, × 1, from Rock Marsh, Flower Cove, Newfoundland, *Fernald, Pease & Long*, no. 27,927; FIG. 2, flowers, showing drooping lip, × 4, from the type region, Cedar Lake, Herkimer Co., New York, *J. V. Haberer*, no. 893; FIG. 3, fruit, showing reflexed perianth, × 4, from Mars Hill, Maine, September 8, 1896, *Fernald;* FIG. 4, buds, just before expansion, × 4, from Rivière aux Marsouins, Quebec, *Fernald & Weatherby*, no. 2429. M. MONOPHYLLOS (L.) Sw.: FIG. 5, flowers, showing erect lip, × 4, from Kloster-Schwaderloch, Switzerland, *Zoja* in *Braun-Blanquet*, Fl. Raet. Exsicc., no. 123; FIG. 6, fruit, with shriveled perianth projected forward, × 4, from St. Petersburg, Russia, *Herb. Fl. Ingricae*, no. 627; buds, just before expansion, × 4, from Graswangthal, Bavaria, *F. Schultz*, Herb. Norm., no. 950.

PLATE 254. SALIX WIEGANDII Fern., × 1: FIG. 1, mature branchlet, from Pointe Riche, Newfoundland, *Fernald, Long & Fogg*, no. 1605; FIGS. 2 and 3, flowering (pistillate) branchlets from the TYPE collection, Gargamelle Cove, Newfoundland, *Fernald, Long & Fogg*, no. 1602.

PLATE 255. ARENARIA MARCESCENS Fern.: FIG. 1, fragments, in flower, × 1, from Mt. Albert, Quebec, *Fernald, Griscom, Mackenzie & Smith*, no. 25,725; FIG. 2, fragment, in fruit, × 1, from the TYPE, Blomidon, Newfoundland, *Fernald & Wiegand*, no. 3365; FIG. 3, seeds, × 10, from the TYPE, no. 3365.

PLATE 256. ARENARIA NORVEGICA Gunn.: FIG. 1, entire plant, × 1, from Lake Torneträsk, Torne Lappmark, *Alm*, Intern. Phytogeogr. Exc., no. 3897: FIG. 2, seeds, × 10, from Hjerkinn, Norway, *A. S. Pease*, no. 20,773. A. CYLINDROCARPA Fern.: FIG. 3, fragments in young fruit, × 1, from The Tableland, Bonne Bay, Newfoundland, *Fernald, Long & Fogg*, no. 1675; FIG. 4, flower, to show expanded calyx, × 6, from Mt. Albert, Quebec, *Fernald, Griscom, Mackenzie & Smith*, no. 25,730; FIG. 5, mature capsule and calyx, × 6, from St. John Island, Newfoundland, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 28,180; FIG. 6, seeds, × 10, from no. 28,180.

PLATE 257. CERASTIUM TERRAE-NOVAE Fern. & Wieg.: FIG. 1, small plants, × 1, from The Tableland, Bonne Bay, Newfoundland, *Fernald, Long & Fogg*, no. 1685; FIG. 2, seeds, showing one with ruptured testa, × 10, from the TYPE, Blomidon, Newfoundland, *Fernald & Wiegand*, no. 3390.

PLATE 258. LESQUERELLA ARCTICA (Wormsk.) Wats.: FIG. 1, small plant, × 1, from Sewell Harbor, lat. 78° 30′, western Greenland, *Ralph Robinson*, no. 38; FIG. 2, fruit, × 1, from Nûgssuaq Halvø, Pâtût, lat. 70° 15′, western Greenland, July 3, 1929, *M. P. & R. T. Porsild;* FIG. 3, flower (shriveled), showing lance-acuminate sepals, × 4, from Ritenbenks Kulbrud, lat. 70° 3′, Disco, Greenland, June 4, 1924, *A. E. Porsild*. L. PURSHII (Wats.) Fern.:

fig. 4, small plant, × 1, from Big Brook, Straits of Belle Isle, Newfoundland, *Long & Gilbert*, no. 28,335; fig. 5, fruit, × 1, from Green Gardens, Cape St. George, Newfoundland, *Mackenzie & Griscom*, no. 11,016; fig. 6, flower, showing oblong, obtuse sepals, × 4, from Gargamelle Cove, Newfoundland, *Fernald, Long & Fogg*, no. 1725.

Plate 259. Epilobium Pylaieanum Fern.: figs. 1, 2 and 3, fruiting and flowering plants, × 1, from Burgeo, Newfoundland, *Fernald, Long & Fogg*, no. 332; fig. 4, flower, showing oblong, obtuse calyx-lobes, × 6, from no. 332; fig. 5, seed, showing slender beak, × 10, from the type, Port aux Basques, Newfoundland, *Fernald, Long & Dunbar*, no. 26,865.

Plate 260. Vaccinium nubigenum Fern.: flowering branch, × 1, from Deep Gulch, Doctor Hill, Newfoundland, *Fernald, Long & Fogg*, no. 1936; fig. 2, margin of leaf, × 4, from no. 1936; fig. 3, flower, × 4, from no. 1936; fig. 4, anthers, × 8, from no. 1936. V. cespitosum Michx.: anthers, × 8, from Flower Cove, Newfoundland, *Pease, Long & Gilbert*, no. 28,868. V. ovalifolium Sm.: anthers, × 8, from Mt. Hood, Oregon, *Henderson*, no. 744.

Plate 261. Aster Tradescanti L., × ⅔: type of species in Clifford Herbarium, British Museum, with designation of Asa Gray, "vera" (photographed by *M. L. Fernald*, September, 1903).

Plate 262. Aster Tradescanti L., × ½: upper three-fourths of sheet from Sandy Cove, Digby Co., Nova Scotia, *Fernald & Long*, no. 22,762, identified (correctly) by Wiegand as *A. saxatilis* (Fern.) Blanchard.

Plate 263. Antennaria columnaris Fern., × 1, from the type collection, Gargamelle Cove, Newfoundland, *Fernald, Long & Fogg*, no. 2076; insert, × 2, to show tips of crowded cauline leaves.

Plate 264. Antennaria Foggii Fern., × 1, from type collection, Old Port au Choix, Newfoundland, *Fernald, Long & Fogg*, no. 2100; insert, × 2, to display leaf-tips and coherent bracts.

Plate 265. Antennaria Bayardi Fern., × 1, from type collection, Tucker's Head, Bonne Bay, Newfoundland, *Fernald, Long & Fogg*, no. 2097; insert, × 2, to show leaf-tips and loose bracts.

Plate 266. Antennaria brunnescens Fern., × 1, from type collection, alt. 650 m., Killdevil, Bonne Bay, Newfoundland, *Fernald, Long & Fogg*, no. 2105; insert, × 2, to show leaf-tips and broad bracts.

Plate 267. Antennaria cana (Fern. & Wieg.) Fern., × 1, plant at left from type station of species, Pointe Riche, Newfoundland, *Fernald, Long & Fogg*, no. 2087; plant at right from type collection of *A. Longii* Fern., Schooner (or Brandy) Island, Pistolet Bay, Newfoundland, *Pease & Long*, no. 29,177; inserts, × 2, from collections shown below, to display leaf-tips and loose involucres.

Plate 268. Antennaria confusa Fern. (left), × 1, from type collection, Old Port au Choix, Newfoundland, *Fernald, Long & Fogg*, no. 2078; insert × 2. A. gaspensis Fern. (right), × 1, from Penguin Head, Bay of Islands, Newfoundland, *Fernald, Long & Fogg*, no. 2107; insert, × 2.

Plate 269. Arnica chionopappa Fern.: fig. 1, small plant, to show characteristic 3-nerved basal leaves, × 1, from Eastern Point, St. John Bay, Newfoundland, *Fernald, Long & Fogg*, no. 2136; fig. 2, achene and disk-corolla, × 6, from Shag Cliff, Bonne Bay, Newfoundland, *Fernald, Long & Fogg*, no. 2137. A. tomentosa J. M. Macoun: figs. 3 and 4, small plants, × 1, from Old Port au Choix, Newfoundland, *Fernald, Long & Fogg*, no. 2127; fig. 5, achene and disk-corolla, × 6, from no. 2127.

Plate 270. Arnica Louiseana Farr: fig. 1, small plant, × 1, from Eastern Point, St. John Bay, Newfoundland, *Fernald, Long & Fogg*, no. 2140; fig. 2, achene and disk-corolla, × 6, from Pointe Riche, Newfoundland, *Fernald, Long & Fogg*, no. 2143. A. terrae-novae Fern.: fig. 3, small plants, × 1, from Eastern Point, St. John Bay, Newfoundland, *Fernald, Long & Fogg*, no. 2124; fig. 4, achene and disk-corolla, × 6, from Gargamelle Cove, Newfoundland, *Fernald, Long & Fogg*, no. 2126.

PLATE 271. TARAXACUM CERATOPHORUM (Led.) DC.: FIGS. 1 and 2, small plant and individual head, to show characteristic involucre, × 1, from Gargamelle Cove, Newfoundland, *Fernald, Long & Fogg*, no. 7172; FIG. 3, achene with beak and pappus, × 1, from no. 7172; FIG. 4, achene, × 10, from no. 7172. T. AMBIGENS Fern.: FIG. 5, small leaf, × 1, from the TYPE, Port au Choix, *Fernald, Long & Fogg*, no. 2167; FIG. 6, head, with characteristic reflexing outer bracts, × 1, from the TYPE; FIG. 7, achene with beak and pappus, × 1, from the TYPE; FIG. 8, achene, × 10, from the TYPE. T. AMBIGENS, var. FULTIUS Fern.: FIG. 9, head, showing appressed outer involucre, × 1, from the TYPE, Gargamelle Cove, Newfoundland, *Fernald, Long & Fogg*, no. 2163. T. LAPPONICUM Kihlm.: FIG. 10, characteristic achene, × 10, from Sandy (Poverty) Cove, Straits of Belle Isle, Newfoundland, *Fernald, Long & Dunbar*, no. 27,174.

PLATE 272. TARAXACUM PHYMATOCARPUM Vahl.: FIG. 1, plant, × 1, from Sewall Harbor, lat. 78° 30′, western Greenland, *Ralph Robinson*, no. 40; FIG. 2, achene (dark) with characteristic short beak, × 1, from Netiuleme, Whale Sound, Greenland, *Wetherell*, no. 175, in part; FIG. 3, achene, × 10, from no. 175. T. LYRATUM (Led.) DC.: FIG. 4, achene, × 10, from high alpine region, Colorado, *Hall & Harbour*. T. LAURENTIANUM Fern.: FIG. 5, leaf, × 1, from the TYPE, base of Ha-Ha Mountain, Ha-Ha Bay, Newfoundland, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,245; FIGS. 6 and 7, heads, showing characteristic involucre, × 1, from the TYPE; FIG. 8, achene, with the long beak and long pappus, × 1, from the TYPE; FIG. 9, achene, × 10, from the TYPE. T. DUMETORUM Greene: FIG. 10, achene, × 10, from Medicine Hat, Alberta, June 8, 1894, *John Macoun*.

PLATE 273. TARAXACUM LONGII Fern.: FIG. 1, leaf, × 1, from Grand River, Gaspé Co., Quebec, June 30–July 3, 1904, *Fernald*; FIG. 2, head, showing characteristic involucre, × 1, from the TYPE, base of Ha-Ha Mountain, Ha-Ha Bay, Newfoundland, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, no. 29,244; FIG. 3, achene, with beak and pappus, × 1, from TYPE; FIG. 4, achene, × 10, from TYPE. T. LATILOBUM DC.: FIG. 5, achene, × 10, from Old Port au Choix, Newfoundland, *Fernald, Long & Fogg*, no. 2159. T. TORNGATENSE Fern.: FIG. 6, leaf, × 1, from the TYPE, Head of Nachvak Bay, Labrador, *Woodworth*, no. 443; FIG. 7, head from TYPE; FIG. 8, achene, with comparatively short beak, and pappus, × 1, from TYPE; FIG. 9, achene, × 10, from TYPE.

BRANCHING POLYGONATUM PUBESCENS

M. L. FERNALD AND S. K. HARRIS

ON May 21, 1933, while returning from a field-trip in Vermont with a class of Radcliffe students, we stopped in the wooded area of Ashby in northern Middlesex County, Massachusetts to examine some shrubs which had caused discussion. Stepping from the automobile to the edge of the recently surfaced road we were surprised to find ourselves in a colony of liliaceous plants which, at first, were unrecognized. Examination showed that these were an aberrant form of the common Solomon's Seal of northeastern America, *Polygonatum pubescens* (Willd.) Pursh, with elongate, spreading or ascending leafy branches replacing the ordinary naked drooping peduncles. So far as we can

find, no such form has been described in America, though in Europe similar forms of *P. multiflorum* (L). All. have been found at several stations since the first of them was noted in Switzerland prior to 1826.

The first discovered of these European plants was treated as a species, *Convallaria bracteata* Thomas (without diagnosis) in Steudel & Hochstetter, Enum. Pl. Germ. Helv. Prodr. 50 (1826), and (with full description) in Gaudin, Fl. Helv. ii. 531 (1828), but on the preceding page of the latter work it was treated doubtfully as a variety, *C. multiflora,* ? γ. *bracteata* Gaud. l. c. 530 (1828), based in part (as to name) upon *C. bracteata* of the next page. This plant, as represented in the Gray Herbarium by a sheet of Thomas' original material from Bex, another collected by Alexander Braun in Baden and by the illustration in Reichenbach's Icones (x. t. ccccxxxiii. fig. 963), has the inflorescences no longer than in ordinary *P. multiflorum* but it differs in having leafy bracts on the pedicels. It was transferred to *Polygonatum* as *P. multiflorum,* γ. *bracteatum* (Thomas) Kunth, Enum. v. 139 (1850).

Another form of *Polygonatum multiflorum* is more comparable with our plant, having the branches elongate and with larger leaves. This was described from Baden as *Convallaria multiflora,* γ. *ramosa* Doell, Fl. Baden, i. 384 (1857) and later transferred to *Polygonatum* as *P. multiflorum,* var. *ramosum* (Doell) Geisenheymer, Deutsche Bot. Monatsschr. xi. 35 (1893).

All these variations appear to be forms rather than true geographic varieties and as such should be called

POLYGONATUM MULTIFLORUM (L.) All., forma **bracteatum** (Thomas), comb. nov. *Convallaria bracteata* Thomas in Steud. & Hochst. Enum. Pl. Germ. Helv. Prodr. 50 (1826), name only, and in Gaud. Fl. Helv. ii. 531 (1828). *C. multiflora,* ? γ. *bracteata* (Thomas) Gaudin, l. c. 530 (1828) at least as to syn. *C. bracteata.* *P. multiflorum,* γ. *bracteatum* (Thomas) Kunth, Enum. v. 139 (1850).

P. MULTIFLORUM, forma **ramosum** (Doell), comb. nov. *Convallaria multiflora,* γ. *ramosa* Doell, Fl. Baden, i. 384 (1857). *P. multiflorum,* var. *ramosum* (Doell) Geisenh. Deutsche Bot. Monatsschr. xi. 35 (1893).

P. PUBESCENS (Willd.) Pursh, forma **fultius**, forma nov. (FIG. 1), pedunculis axillaribus in ramos elongatos adscendentes foliosos mutatis; ramis imis foliis subtendentibus aequantibus vel superantibus, floribus 1–3 subsessilibus in axillis foliorum ramorum.—MASSACHUSETTS: roadside at border of dry woods, Ashby, May 21, 1933, *Fernald & Harris,* no. 2590 (TYPE in Gray Herb., isotype in herb. New England Bot. Club).

Polygonatum pubescens, forma *fultius* occurred in some quantity (about 20 plants) at the margin of a recently remade road; farther back, in undisturbed woods, the abundant *P. pubescens* was quite typical, in having naked, pendulous, simple or forking peduncles. The inference is at least reasonable that the mishap of road-improvement, occurring at the border of a colony of *P. pubescens*, induced the mutation or sporting of the plants most disturbed.[1] Five living

Fig. 1. POLYGONATUM PUBESCENS, forma FULTIUS, × ¼.

plants transferred to the shrubbery of the senior author have grown all summer but, although they flowered freely and held their marcescent perianths for some weeks, they utterly failed to set fruit. For a photograph (FIG. 1) of one of these plants, × ¼, we are indebted to

[1] Such results of injury are often noted. The following, of recent date, is to the point: "OSMUNDA CINNAMOMEA f. FRONDOSA (T. & G.) Britton. . . . Several plants in a small colony with the wet soil around the plants more or less covered with hardened road tar from highway construction close by. Normal spore-bearing fronds were entirely absent, every frond being fertile at the tip only, ... Since abnormal forms are often associated with certain types of injury or unnatural conditions the presence of the road tar is possibly to be associated with the development of these spore-bearing leafy fronds."—H. D. House, Am. Fern Journ. xxiii. 4, 5 (1933).

Mr. Henry G. Fernald. Other plants given to Dr. Edgar Anderson to grow were not allowed to attempt fruiting.

It is not improbable that *Polygonatum pubescens*, forma *fultius* is a sterile or vegetative mutant. At least, the infertility of its European counterparts has been noted, Geisenheymer specially stating of them: "alle Blüten sind unfruchtbar. In der sehr langen und dünnen Perigonröhre ist keine Spur eines Fruchtknotens zu finden."

Gray Herbarium.

Vol. 35, no. 419, including pages 351 to 386 and plates 269 to 273, was issued 3 November, 1933.

ERRATA

Page 1, line 9; *for* 271 *read* 273.
" 52, line 5; *for* de Pylaie *read* de la Pylaie.
" 66, line 14; *for* Staph *read* Stapf.
" 99, line 25; *for* problen *read* problem.
" 166, line 19; *for* L'Aigle *read* l'Aigle.
" 186, last line; *for March* read *April.*
" 201, line 11; *for* Alka-kengi *read* Alkekengi.
" 208, line 8; *for* 1, 2 and *a read* 3, 4 and 5.
" 208, line 14; *for* 1 and 2 *read* 3 and 4.
" 208, line 19; *for a read* 5.
" 209, line 30; *for* 3 and *b read* 1 and 2.
" 215, line 26; *for* (Torr.) Hitchc. *read* of Nfd. records.
No. 414, table of contents; *for* 223 *read* 224.
Page 224, lines 2 and 4 from bottom; *for* Neomammallaria *read* Neomammillaria.
" 230, line 31; omit *C.* before *Hostiana.*
" 231, line 13; *omit* period *after* Junge.
" 258, line 12; *for* 1851 *read* 1857.
" 307, line 7, *for* other's *read* others'.
" 314, line 3; *omit* first parenthesis.
Plate 271, opp. page 368, in explanation of plate, line 6; *for* fultior *read* fultius.
Page 376, line 30; *for* fultior *read* fultius.

INDEX TO VOLUME 35.

New scientific names are printed in full-face type.

Abies, 358; balsamea, 122, 322, 358; Fraseri, 320, 322
Acalypha digyneia, 39
Acer rubrum, 250; saccharinum, 158, 250; saccharum, 391; Treleaseanum, 391
Acerates viridiflora, var. lanceolata, 363, var. linearis, 289
Acrothrix novae-angliae, 149, 150
Actaea alba, 249; rubra, 249
Adder's Mouth, White, 242
Adder's Tongue, 352; Family, 352
Adiantum, 130; Capillus-Veneris, 129; pedatum, 129, 130, 249, var. aleuticum, 10, 83, 129
Agalinis tenuifolia, var. macrophylla, 360
Agardhiella tenera, 149
Ageratum, 46
Agoseris gaspensis, 338
Agrimonia gryposepala, 202; mollis, 39, 200, 202; rostellata, 200
Agropyron, 55, 94, 161–185; alaskanum, 169; biflorum latiglume, 169; caninoides, 181; caninum, 161, 162, 164, 165, 180, f. glaucum, 177, 179, var. Hornemanni, 163, 164, 171, 174, var. Hornemanni, f. pilosifolium, 175, 177, var. latiglume, 169, caninum pubescens, 180, f. pubescens, 180, var. Richardsoni, 181, var. tenerum, 170, var. tenerum, f. ciliatum, 177, var. tenerum, f. Fernaldii, 166, 173, 174, var. unilaterale, 181, var. unilaterale, f. ciliatum, 182, f. violascens, 181; dasystachyum, 167, 168; § Goularda, 161, 167, 168, in Eastern North America, 161; § Holopyron, 167; junceum × littoreum, 167; latiglume, 161, 164, 168, 169, 174; litorale, 167; litorale × repens, 167; littoreum, 167; mutabile, 169; novae-angliae, 162–165, 174; pauciflorum, 169; pseudorepens, 162–164, 171, 173, 174, 400; pseudorepens magnum, 170, 171; pungens, 167, 168, 400, pl. 245; repens, 167, 168, 181, 183–185, 400, pl. 245, The American Variations of, 182, f. aristatum, 183, 185, 400, pl. 245, var. glaucum, 177, var. maritimum, 165, var. novae-angliae, 174, f. **pilosum, 183, 184,** var. pilosum, 184, f. pubescens, 165, 184, subvar. pubescens, 184, var. subulatum, 183–185, 400, pl. 245, var. subulatum, f. **heberhachis, 184,** 185, var. subulatum, f. **setiferum, 184,** 185, var. subulatum, f. **Vaillantianum, 183**–185, 400, pl. 245, var. tenerum, 170, f. trichorhachis, 183–185, var. Vaillantianum, 184; Richardsoni, 162, 165, 181, 182, Richardsoni ciliatum, 182; Smithii, 167, 168; spicatum, 168; tenerum, 162–165, 170, 171, 399, tenerum ciliatum, 177, tenerum longifolium, 170, 171, tenerum magnum, 170, 171, tenerum majus, 171, 174, var. novae-angliae, 174, var. pseudorepens, 171, tenerum trichocoleum, 177; tetrastachys, 167; trachycaulum, 162–165, 168, 169, 181, 399, pl. 243, var. caerulescens 166, 177, 180, 400, var. ciliatum, 165, 182, var. Fernaldii, 165, 166, 173, 174, var. glaucescens, 166, 174, var. glaucum, 164–166, 169, 177–180, 400, map 18, pl. 244, var. **majus,** 169, **171,** 172, 174, 181, 400, map 16, pl. 243, var. **novae-angliae,** 169, **174,** 175, 400, map. 17, pl. 243, var. pilosiglume, 400, var. Richardsoni, 181, var. tenerum, 170, var. trichocoleum, 165, 177, var. **typicum, 169,** 170, map 15, var. unilaterale, 169, 172, 181, 400, map 19, pl. 244; unilaterale, 162, 165, 181, 182; violaceum, 164, f. caninoides, 181, violaceum latiglume, 169, var. majus, 166, 171, 174, violaceum, β virescens, 171, 174; violascens, 181; yukonis, 169
Agrostideae, 214
Agrostis, 81; alba, 317; antecedens, 208, 209, 318, 400; borealis, 5, 55, 83, 203–206, 211, 318, The Variations of, 203, var. **americana,** 204, **205,** 206, var. macrantha, 205, var. **paludosa,** 204, 205, **207,** var. **typica, 204,** 206, var.

typica, f. **macrantha, 205;** canina, 206, 211, 317, 318, var. alpina, 204, 206, var. ? tenella, 204, 206; concinna, 204; elata, 211, 318; Elliottiana, 284; geminata, 211, 318, f. **exaristata, 211,** 212; hyemalis, 12, 207–209, 211, 318, 400, pl. 246, var. elata, 211, var. geminata, 211; laxiflora, 209, laxiflora, β montana, 209; melaleuca, 207; Mertensii, 204; novae-angliae, 205–207; paludosa, 55, 207; perennans, 211, 249, 317, 318, var. aestivalis, 318, var. aestivalis, f. **atherophora, 317,** f. **chaetophora, 317;** Pickeringii, 205, 207, Pickeringii, β rupicola, 204, 205; Rossae, 203; rubra, 206, var. americana, 205, 206; rupestris, 205, 206; scabra, 5, 12, 207–209, 211, 317, var. **septentrionalis, 209,** 211, 400, pl. **246,** var. septentrionalis, f. **setigera, 210,** 211, 318, f. **Tuckermani, 207,** 209; Schweinitzii, 318; stolonifera, 317, f. **aristigera, 317,** var. compacta, 252; tenuis, 317; verticillata, 317

Alchemilla minor, 274; vulgaris, 274, var. filicaulis, 58, 274, var. vestita, 58, 274

Algae from Penikese Island, The David Starr Jordan, 147; New Records of Marine, 151

Algal Vegetation, Changes in the Woods Hole, 150

Alisma Plantago-aquatica, subsp. brevipes, 251

Allium mutabile, 362; vineale, 362

Alnus crispa, 122, var. mollis, 122; incana, 251

Alopecurus aequalis, var. natans, 120, 125; geniculatus. 361, var. ramosus, 361; ramosus, 361

Alsinopsis obtusiloba, 11

Alyssum alyssoides, 248

Amaranthus blitoides, 362; graecizans, 362

Amblystegiella, 146

Ambrosia psilostachya, 361

Amelanchier Fernaldii, 56, 272; laevis, 272

America, Calamagrostis epigejos, var. georgica in, 64

American Larch, 358; Species of Elymus, Types of some, 187; Variations of Agropyron repens, The, 182; Yew, 357

Amphicarpa, 276; **bracteata, 276;** monoica, 276; Pitcheri, 276

Ancistrocactus Scheerii, 225

Anderson, Edgar. Color Variation in a Missouri Colony of Hepatica acutiloba, 66; The Distribution of Iris versicolor in Relation to the Post-glacial Great Lakes, 154

Anderson, W. A. A New Species of Glyceria from the Great Smoky Mountains, 320

Andromeda, 112

Andropogon virginicus, 361

Androsace, 96; septentrionalis, 81, 82, 96, 280, 298, map 5

Androscoggin Co., Maine, Roripa amphibia in, 262

Anemone canadensis, 251; multifida, 47, 266, var. hudsoniana, 266; parviflora, 47

Angelica laurentiana, 58, 60, 279; villosa, 288

Annotations on Herbarium Sheets, 41

Another Massachusetts Station for Calluna vulgaris, 294

Antennaria, 51–55, 83, 89, 327–346, 373, in Newfoundland, The Genus, 327; albicans, 329, 331, 340; alpina, 334, var. cana, 337, 338; angustata, 332; **Bayardi,** 328, **333,** 334, 402, pl. **265;** borealis, 336; **brunnescens,** 328, **336,** 402, pl. **266;** cana, 88, 329, 333, 337–339, 400, pl. 267; canadensis, var. spathulata, 340; chilensis, 335; **columnaris,** 328, **331,** 332, 402, pl. **263; confusa,** 329, 332, **338**–340, 402, pl. **268;** eucosma, 275, 328, 330, 331; **Foggii,** 328, **332,** 333, 336, 402, pl. **264;** fusca, 336; **gaspensis,** 329, **341,** 342, 402, pl. **258;** grandis, 345; intermedia, 334; isolepis, 334; Longii, 337–339, 402, pl. 267; magellanica, 334, 335; neodioica, 330, 341–343, 345, var. attenuata, 89, 342, 345, var. chlorophylla, 345, 346, var. gaspensis, 341, 342, 346, var. grandis, 330, 345, var. **interjecta, 345,** var. rupicola, 342, var. subcorymbosa, 346, var. **typica, 345,** 346; petaloidea, 346, var. subcorymbosa, 330, 344, 346, map 27; pulcherrima, 331; pygmaea, 333; rupicola, 330, 342, 343, 345, map 26; spathulata, 54, 329, 340, 346; straminea, 329, 335, 340; subviscosa, 334; um-

brinella, 334; vexillifera, 275, 329, 338, 340; Wiegandii, 54, 329, 340
Antithamnion americanum, 148; cruciatum, 148
Anychia canadensis, 39
Apera spica-venti, 261
Apios tuberosa, 251
Aplectrum hyemale, 360, 362
Apocynum cannabinum, 251
Arabis alpina, 60, 121, 270, f. **phyllopetala, 270;** Drummondi, 89, 270; hirsuta, 363; lyrata, 286
Arbor Vitae, 359
Arceuthobium pusillum, 90, 265
Arctostaphylos, 348–350; alpina, 5, 121; rubra, 275; Uva-ursi, var. coactilis, 348, 350, Heterochromism in, 348, var. coactilis, f. **heterochroma, 350**
Arenaria arctica, 10; ciliata, 11, var. humifusa, 11, var. norvegica, 11; cylindrocarpa, 10, 11, 83, 120, 265, 401, pl. 256; dawsonensis, 48; laricifolia, 10; marcescens, 10, 11, 83, 265, 401, pl. 255; norvegica, 11, 265, 401, pl. 256; obtusiloba, 11; peploides, var. maxima, 11; serpyllifolia, 248, 390; verna, var. pubescens, 120
Arethusa bulbosa, 5, 241
Argentina Anserina concolor, 273; Anserina sericea, 273; argentea, 273
Aristida adscensionis, 284; dichotoma, 284; fasciculata, 284; geniculata, 318, 319; gracilis, 318, 319, 386, var. depauperata, 319; intermedia, 200; longespica, 318, 319, 386, in Connecticut, 386, var. **geniculata, 318,** 386; purpurascens, 200, 284; stricta, 319
Arnica, 53, 55, 373; alpina, 365; § Alpinae, 368; angustifolia, 366; arnoglossa, 367; § Arnoglossae, 368; attenuata, 365, 366; chionopappa, 57, 81, 365–367, 402, map 29, pl. 269; Fernaldii, 51, 53, 367; Griscomi, 53, 368; Louiseana, 365, 368, 369, 402, map 30, pl. 270; § Obtusifoliae, 368; plantaginea, 275, 365; pulchella, 364, 365; terrae-novae, 53, 275, 331, 365, 366, 402, map 28, pl. 270; tomentosa, 53, 364, 365, 402, pl. 269
Artemisia borealis, 7, 121, 145, 346, var. latisecta, 7, 346, var. Purshii, 346; canadensis, 50; frigida, 255
Asarum canadense, 249
Asclepias incarnata, 251; syriaca, 252
Ascophyllum, 293
Asparagopsis hamifera, 149, 150
Asperococcus, 257
Aspidium cristatum, 59; simulatum, 200; Thelypteris, 200
Asplenium, 351; Adiantum-nigrum, 47; angustifolium, 360; Filix-femina, 361; montanum, 351; murorum, 47; nigrum, 47; platyneuron, 249; Ruta-muraria, 47; Trichomanes, 47; Trichomanes-ramosum, 47, 235; viride, 47, 120, 235, 390
Aster, 323, 359; A Study of the Rocky Mountain Species of the Multiflori Section of, 323; acuminatus, 4, 311; adscendens, 37; adsurgens, 324–326; agrostifolius, 38; ambiguus, 35; bellidiflorus, 23, 28, 29, 33; carneus, 21, 22, carneus, γ ambiguus, 35, 36, carneus β subasper, 24; chelonicus, 38; clivorum, 38; coerulescens, 20, 26–28, 37, var. **Wootonii, 20, 28;** commutatus, 323–326; concolor, 144; cordifolius, 17, 38; Cordineri, 326, 327; crassulus, 325, 326; diffusus, 24; dumosus, 17, 37; durus, 26; eminens, 23; ericoides, 17, 27, 31, 37, 323–325; exiguus, 325; falcatus, 325–327; fluvialis, 26; fluviatilis, 26; fragilis, 37; frondosus, 182; Greenei, 37; hebecladus, 325; hesperius, 21, 22, 26, 27, var. Wootonii, 28; hirsuticaulis, 24; incanopilosus, 326; **interior,** 21, 31, 33, **35;** Jacobaeus, 32; junceus, 23; laetevirens, 21, 28, 36, 38; laevis, 17, 203; lateriflorus, 16–19, 30–32, 36, 37, 312, var. pendulus, 26, 37, 38; lautus, 26, var. prinoides, 26; longifolius, 23, 24; miser, 24; missouriensis, 17, var. thyrsoideus, 31, 32, 34; multiflorus, 323, 325, 326, var. commutatus, 326, var. exiguus, 325, var. stricticaulis, 325; nemoralis, 5, var. Blakei, 144, 312, var. major, 144, 312; novi-belgii, 17; obliquus, 21; ontarionis, 16, 38; Osterhoutii, 36; paniculatus, 16–20, 28, 30–35, 312, 314, and some of its Relatives, 16, var. acutidens, 33, var. bellidiflorus, 28, 29, 33, var. cinerascens, 33, var. lanatus, 33, var. polychrous, 26, var. simplex, 20,

23, 30, 32, 33, 38; patens, 202; pendulus, 24; philadelphicus, 37; polycephalus, 325; praealtus, 16–18, 21, 23, 25–27, 29, 30, 32, var. **angustior, 19, 24,** 37, var. **imbricatior,** 20, **26,** var. **nebraskensis,** 20, **25,** 26, var. **subasper, 20, 24,** 25, var. **texicola,** 20, **25,** 27; ptarmicoides, 291; puniceus, 17, 18, 23, 32, 33, 37, 38; puniceus × paniculatus, 32; radula, 311; ramulosus, 326; ramulosus β, 326; rigidulus, 21; salicifolius, 21–23, 27, 31, 33, var. caerulescens, 26, 27, var. stenophyllus, 24, var. subasper, 24, 291; salignus, 23, 32, 33; saxatilis, 16, 20, 30, 34, 312–314, 402, pl. 262; scoparius, 325; serotinus procerior, 31; simplex, 31–33; stenophyllus, 24; stricticaulis, 325; subasper, 24, 25; tardiflorus, 17, 38; tenuifolius, 28, 31, 37, tenuifolius γ bellidiflorus, 28, tenuifolius β ramosissimus, 28; Tradescanti, 29–31, 35, 36, 312–314, 402, pl. 261, 262, The Identity of, 312, var. saxatilis, 34; undulatus, 17, 33; vimineus, 16, 17, 30, 31, 34, 37, 38, 312, var. saxatilis, 34; Wootonii, 28

Astragalus alpinus, 121; eucosmus, 50, 274; stragulus, 275

Astrophytum, 225; asterias, 224, 225, in Texas, The Habitat of, 224

Athyrium alpestre, 58, 129, var. americanum, 129; angustum, 360, 361, var. laurentianum, 250, var. rubellum, 129; Filix-femina, var. sitchense, 128, 129, map 13

Atragene columbiana, f. **albescens, 347;** pseudoalpina, 347

Aureolaria flava, var. macrantha, 289

Avena fatua, 203

Axyris amarantoides, 262

Azolla, 354; caroliniana, 354

Bacopa acuminata, 289

Balm-of-Gilead Fir, 358

Balsam Fir, 358

Bartonia, 6, 13, 85; paniculata, 5, 280, 281, map 24; var. iodandra, 6, 280

Bartsia alpina, 121, 125, 275

Bellis perennis, 15, 311

Benke, H. C. New Species and Forms from the Central and Southern United States, 44

Berlandiera texana, 291

Betula Michauxii, 12, 123; nana, 12; papyrifera, 122

Bidens cernua, var. minima, 262; connata, var. ambiversa, 391, var. petiolata, 391, var. **submutica, 391;** discoidea, 291; frondosa, var. anomala, 389; involucrata, 360

Black Larch, 358; Spruce, 358

Blake, S. F. Charles Albert Robbins, 1874–1930, 140; Wolfiella lingulata in Louisiana, 226

Bog Spruce, 258

Boraginaceae, 66

Botrychium, 353; angustisegmentum, 95, 130, 353; dissectum, 353, f. elongatum, 353, f. obliquum, 353, f. oneidense, 353; lanceolatum, 95, var. angustisegmentum, 353; Lunaria, 47, 94, 95; matricariaefolium, 89, 95, 130, 353; multifidum, 95, var. intermedium, 353; obliquum, 353, 361, var. dissectum, 353, var. elongatum, 353, var. oneidense, 353; ramosum, 353; simplex, 4, 95, 130, 353; tenebrosum, 353; ternatum, var. intermedium, 353, var. oneidense, 353, var. rutaefolium, 95; virginianum, 353, 360, var. europaeum, 95, 277, var. intermedium, 353

Bouteloua, 182

Brachytrichia Quoyi, 150

Branching Polygonatum pubescens, 403

Brickellia grandiflora, 290

Bromus, 181; altissimus, 316, f. incanus, 316; arvensis, 361; ciliatus, 316, var. incanus, 316; commutatus, 200, 317; hordeaceus, 200, 317, f. leptostachys, 316, var. leptostachys, 316, 317; incanus, 316; inermis, f. **aristatus, 316,** var. aristatus, 316, f. **villosus, 316;** japonicus, 361; latiglumis, 316, f. **incanus, 316;** marginatus, 182; mollis, 316, 317, mollis β leiostachys, 316, f. **leiostachys, 316,** mollis β leptostachys, 317, f. leptostachys, 316; pratensis, 317; purgans, 316, purgans incanus, 316, purgans latiglumis, 316; racemosus, 317, 361; secalinus, 361

Brotherella, 146

Burmanniaceae, 106

Butters, F. K. Identity of Heuchera hispida Pursh, 111

Calamagrostis, 125; arenicola, 64; canadensis, 213, 251, var. Langsdorfi, 120; epigejos, 65, var. georgica, 64, 65, in America, 64; georgica, 65; hyperborea, 213, 214, hyperborea americana, 214, hyperborea elongata, 214; inexpansa, 55, 214, var. brevior, 214, var. robusta, 213, 214; neglecta, 120, 214, var. borealis, 214; perplexa, 212, 213; Pickeringii, 212, map 20, var. debilis, 212; Porteri, 212; purpurascens, 213, var. **macrantha, 213,** var. parvigluma, 213; urelytra α macrantha, 213, urelytra β parvigluma, 213

Callirhoe Papaver, 287

Callithamnion Baileyi, 149; corymbosum, 148; roseum, 148

Callitriche, 124, 185; anceps, 185, in New England, 185; Austini, 200; deflexa Austini, 200; heterophylla, 185, 200

Calluna vulgaris, Another Massachusetts Station for, 294

Calopogon pulchellus, 5, 85, 241

Caltha palustris, 277

Calypso, 61; bulbosa, 60

Campanula rotundifolia, 56, var. alaskana, 57, 310; uliginosa, 252

Camptosorus rhizophyllus, 249

Capillaire, 129

Cardamine, 16, 125; flexuosa, 16, 267, 277; pensylvanica, 16, 267; pratensis, var. angustifolia, 120, var. palustris, 15, 267

Carex, 55, 84, 139, 235; albicans, 249; albursina, 249; alpina, 120, 220–223, 398, 400, map 21, pl. 248, in North America, 220, f. inferalpina, 223, 398, var. inferalpina, 222, 223, 398, map 21, pl. 248, var. Stevenii, 222, 223, 398, map 21, pl. 248, var. **typica, 222;** angarae, 223, 398; angustior, 219; aquatilis, 230; § Atratae, 220; bicolor, 57, 120, 125; bipartita, 120; brunnescens, 59; Buxbaumii, 84, 220, f. dilutior, 84, 220; canescens, 59; capillaris, 120, 277; capitata, 120, 275, 336; cephalantha, 219; concinna, 220; concolor, 59, 120, 125; crinita, 230; cryptolepis, 231; deflexa, 219; Deinbolleana, 218; Deweyana, 219, 249; dioica, 218; duriuscula, 217–219; eburnea, 249; exilis, 5, 85; flava, 90, 91, 231, 251; flava × Hostiana, 230; flava × Hostiana, var. laurentiana, 230; flava × lepidocarpa, 231; flava × Oederi, f. subviridula, 231; flava × Oederi, var. pumila, 231; flava, var. pumila, 231, var. viridula, 231; × fulva, 230; glacialis, 55, 120; glareosa, 120, 125; gracillima, var. humilis, 220; granularis, 251; gynocrates, 218; Halleri, 220, 221; Hitchcockiana, 285; hormathodes, 13, 90, 219; Hostiana, 231; Hostiana × lepidocarpa, 231; Hostiana, var. laurentiana, 91, 230, 231; Hostiana, var. laurentiana × lepidocarpa, 231; hystericina, 251; incurva, 60, 120, 216–218, 336, 395, 396, var. inflata, 396, var. melanocystis, 397, var. misera, 397, var. setina, 55, 56, 216, 218, 395–397, 400, map 4, pl. 247; jucunda, 396; **Langeana, 217**–219, 400, pl. **247;** lasiocarpa, 230; lenticularis, 59; lepidocarpa, 277; × Leutzii, 231; limosa × rariflora, 220; livida, var. Grayana, 5, 85; Macloviana, 335; maritima, 167, 396, 397, var. brunnescens, 398, var. erectiuscula, 398, var. **melanocystis, 397,** var. **misera, 397,** var. **setina, 397,** 400, pl. 247; melanocystis, 397, var. misera, 397; microglochin, 57, 120, 125, 139, 232, 336; misera, 397; novae-angliae, 219; Oederi, 231, 232, var. pumila, 91, 231, var. viridula, 231; orthocaula, 396; paleacea, 397, 398, var. **brunnescens, 398,** var. **transatlantica, 397;** pedunculata, 249; × Pieperiana, 231; platyphylla, 249; × **pseudofulva, 231;** psychroluta, 397; rariflora, 5, 120, 125; Richardsonii 253; rigida, 59; rosea, 249; rupestris, 51, 89, 120; salina, var. kattegatensis, 398, var. pseudofilipendula, 230; scirpoidea, 5, 81, 91, 120, 388; scoparia, 219; setina, 396; sparganioides, 249; stellulata 90; stenophylla, 217; stipata, 277; stricta, 59; stylosa, 58, 89, 230; × **subviridula, 231;** tenuiflora × trisperma, 219; transmarina, 396; × **trichina, 219;** trisperma, var. Billingsii, 5; Tuckermani, 251; ursina, 55; Vahlii, 222, 398, 400, pl. 248, var. **inferalpina, 398,** 400, pl. 248, var. **Stevenii,**

398, 400, pl. 248; vesicaria, 59, 232, 251, var. jejuna, 59, 232, var. **laurentiana, 232,** 233, 400, pl. **248,** var. monile, 232; viridula, 231, 232, vulpinoidea, 251; Wiegandii, 84, 219; × **xanthina, 230,** 231; × xanthocarpa, 230
Carices, 54, 55, 59
Carya cordiformis, 249; ovata, 249
Caryophyllaceae, 261
Cat Spruce, 358
Catabrosa, 139; aquatica, 138–140, 399, pl. 242, var. **laurentiana, 137,** 139, 140, 399, pl. **242,** var. subtilis, 140, var. uniflora, 139, 140, 399, pl. 242
Caulophyllum thalictroides, 285
Cayaponia grandiflora, 289
Cedar, Red, 359; White, 358, 359
Celastrus scandens, 249
Central and Southern United States, New Species and Forms from the, 44
Cephalanthus occidentalis, 251
Ceramium arachnoideum, 148; diaphanum, 148; fastigiatum, 148; rubrum, 148
Cerastium alpinum, 120; arvense, 83; Earlei, 11; Fischerianum, 265; latifolium, 11; Regelii, 275; terraenovae, 10, 11, 83, 265, 401, pl. 257; viscosum, 266; vulgatum, 266
Chaetopteris plumosa, 151, 152
Chamaecyparis, 358; thyoides, 358
Chamaedrys canadensis, 394
Changes in the Woods Hole Algal Vegetation, 150
Charles Albert Robbins, 1874–1930, 140
Cheilanthes californica, 261; Cooperae, 261; lanuginosa, 261; vestita, 261
Chenopodium murale, 362
Chiogenes hispidula, 130
Chloris, 182; verticillata, 361
Chondria Baileyana, 148
Chondriopsis tenuissima, 148
Chrysopsis Berlandieri, 290
Churchill, J. R. Reports on the Flora of Massachusetts,—II, 351
Cicuta bulbifera, 251; maculata, 251
Cinna latifolia, 277
Cinnamon Fern, 352
Circaea alpina, 250; latifolia, 250
Cirsium muticum, 15, f. **lactiflorum, 369;** palustre, 15, 277, 369
Cladonia, 141–143, 237; coniocraea, 150; cristatella, 141, 143; fuscata, 150; symphycarpa, 150
Cladophora gracilis, 149
Claytonia robusta, 362
Clematis occidentalis, var. albiflora, 347; versicolor, 285
Climbing Fern, 352
Clintonia borealis, 322
Clover, Elzada U. The Habitat of Astrophytum asterias in Texas, 224
Club Moss, 355; Family, 355
Cochlearia cyclocarpa, 9, 267; groenlandica, 120, 267; tridactylites, 267
Cockerell, T. D. A. Some Synonymy, 110
Collins, J. F. Moss Flora (notice of Grout, Moss Flora of North America), 146
Color Variation in a Missouri Colony of Hepatica acutiloba, 66
Columbia, Missouri, Notes on the Flora of, 359
Comandra Richardsiana, 55
Common Horsetail, 354; Juniper, 359
Conioselinum pumilum, 10, 83, 279
Connecticut, Aristida longespica in, 386; Desmodium glabellum in northeastern, 38
Conostylideae, 106
Conringia orientalis, 361
Convallaria bracteata, 404; multiflora γ bracteata, 404; multiflora γ ramosa, 404, 405
Corallorrhiza odontorhiza, 39; Wisteriana, 362
Corema Conradii, 348
Cornucopiae hyemalis, 12, 207–209
Cornus alternifolia, 251; Amomum, 251; circinata, 250; femina, 288; paniculata, 363; racemosa, 363; stolonifera, 251; stricta, 288; suecica, 9
Corylus cornuta, 90, 265; rostrata, 90
Coryphantha Runyonii, 224
Crataegus, 49, 359; laurentiana, 49, 272; punctata, 249
Crepis nana, 121, 275
Crithopyrum trachycaulum, 170
Croton Engelmanni, 287
Cryptogramma Stelleri, 47
Curly Grass Family, 352
Cuscuta Gronovii, 251; obtusiflora, 363; Polygonorum, 363
Cycloloma atriplicifolium, 254
Cynoglossum amabile, 66, in Massachusetts, 66; officinale, 248

Cynosurus, 137; cristatus, 137
Cyperoides alpinum tenuifolium, 221
Cyperus dentatus, 68; festivus, 260; flavescens, 285; inaequalis, 260; strigosus, 251
Cypress, 358
Cypripedium acaule, 88, 237, 263, 264, A Teratological Specimen of, 263; parviflorum, 360, var. planipetalum, 57, 237, 401, pl. 250; planipetalum, 237; reginae, 8, map 2
Cystopteris bulbifera, 249, 277

Dactylis cynosuroides, 258; glomerata, 137, var. ciliata, 137, var. detonsa, 137
Dalibarda repens, 74
Danthonia intermedia, 10, 83
Dasystoma laevigata, 202
David Starr Jordan Algae from Penikese Island, The, 147
Deane, Walter (Biographical Sketch), 69
Deanea, 79
Dens leonis, 382; vulgaris, 382
Dentaria diphylla, 249
Deschampsia atropurpurea, 203
Desmodium, 38; bracteosum, 39; canescens, 39; glabellum, 39, in northeastern Connecticut, 38; illinoense, 361; paniculatum, 39; rigidum, 39; rotundifolium, 363
Dianthus Armeria, 362
Diapensia lapponica, 5, 121, 125
Diarina, 40; festucoides, 39, 40
Diarrhena, 39, 40; festucoides, 39, 40; Diarrhena festucoides again, 39
Dicentra canadensis, 249; Cucullaria, 249
Dictyosiphon hippuroides, 149
Diospyros, 106
Dipsacus sylvestris, 364
Dirca palustris, 288
Disappearance of Zostera in 1932, 152
Discoveries in the Newfoundland Flora, Recent, 1, 47, 80, 120, 161, 203, 230, 265, 298, 327, 364, 395
Distribution of Iris versicolor in Relation to the Post-glacial Great Lakes, 154
Distribution of Sorocarpus, On the, 347
Draba, 55, 89, 390; arabisans, 48, var. orthocarpa, 270; brachycarpa, 363; cana, 390; hirta, 120; incana, 120, 127, pl. 239, var. confusa, 399, pl. 239; magellanica, 336; megasperma, 270; nivalis, 120, 275, 298; rupestris, 7, 120, 270; stylaris, 233; verna, 261
Drosera, 106; anglica, 85, 87, 270, 271; anglica β obovata, 87; intermedia, 85, 87, 271; linearis, 57, 271; longifolia, 85; obovata, 87, 270, 271; rotundifolia, 85, 87, 271; § Rossolis, 106
Drouet, Francis. Notes on the Flora of Columbia, Missouri, 359
Dryas, 54; integrifolia, 51, 56, 81, 121, 274, f. **canescens, 273,** 274; var. canescens, 56, 273
Dumontia, 315, in Maine, 315; filiformis, 150, 315

Eames, Edwin H. A New Ludvigia from New England, 227
Eastern North America, Agropyron § Goularda in, 161; Taraxacum in, 369
Eaton, Richard J. Another Massachusetts Station for Calluna vulgaris, 294
Eaton's Ferns of North America, A Suppressed Plate in, 260
Echinocereus enneacanthus, 224; pentalophus, 224; perbellus, 224
Echinochloa Walteri, 252
Echinocystis lobata, 364
Echium plantagineum, 145; vulgare, 248
Eclipta alba, 145
Ectocarpus confervoides, 347; paradoxus in New England, 107; siliculosus, 347
Ectropothecium, 146
Ecuador, An Undescribed Mutisia from, 257
Elatine minima, 13, 278, 387
Eleocharis acicularis, var. submersa, 90, 216; nitida, 85; olivacea, 68; palustris, var. major, 251; parvula, 90, 215; pauciflora, 388; uniglumis, var. halophila, 215
Elymus, 187; Types of some American Species of, 187; arkansanus, 194, 195; australis, 196–198, var. glabriflorus, 197, 198; canadensis, 187–193, 196, var. glabriflorus, 196, 198, f. **glaucifolius, 191,** 196, var. glaucifolius, 192, var. philadelphicus, 191, var. robustus, 192; curvatus, 196, 198; glabriflorus, 196–198; glaucifolius, 189–191, 193, var. robustus, 192;

halophilus, 196, 198; hirsutiglumis, 196–198; hirsutus, 192; intermedius, 196, 198; jejunus, 196, 198; philadelphicus, 188–191, var. hirsutus, 192, var. robustus, 192; robustus, 187, 188, 191, 192, 362, var. vestitus, 187, 189–191; sibiricus, 188; striatus, 193–195, 198, var. arkansanus, 195, 196, var. villosus, 195; villosus, 194–196, f. **arkansanus, 195;** virginicus, 193–198, 251, var. glabriflorus, 198, var. glabriflorus, f. **australis, 198,** var. halophilus, 197, 198, var. halophilus, f. **lasiolepis, 198,** var. hirsutiglumis, 196–198, f. jejunus, 198, var. jejunus, 197, 198, var. submuticus, 198, var. **typicus, 197, 198,** var. typicus, f. **hirsutiglumis, 197, 198; Wiegandii, 192,** 193, 196, f. **calvescens, 192,** 196

Empetrum, 54, 237; Eamesii, 12, 89; nigrum, 89, 121, 125, 238, 239, f. purpureum, 89, 278; rubrum, 335

Entodon, 146

Enteromorpha clathrata, 149

Epidemic among Zostera Colonies, 186

Epilobium, 124; alpinum, 121; angustifolium, 58, var. macrophyllum, 58, 278; boreale, 278; § Chamaenerion, 124; davuricum, 57, 278; glandulosum, var. adenocaulon, 251; Hornemanni, 58, 121; lactiflorum, 58, 89, 121, 125, 279; latifolium, 121; molle, 251; nesophilum, 59; palustre, 12; paniculatum, 390; Pylaieanum, 12, 278, 402, pl. 259; wyomingense, 278

Equisetaceae, 354

Equisetum, 354; arvense, 354; fluviatile, 251, 354; hyemale, var. affine, 354; limosum, 354, f. minus, 354, f. verticillatum, 354; littorale, 354; palustre, 354; pratense, 14, 130, 354; scirpoides, 355; sylvaticum, 354, var. pauciramosum, 354, var. pauciramosum, f. multiramosum, 354; variegatum, 355

Eragrostis, 214

Erigeron hyssopifolius, var. villicaulis, 314, 315, 331; pusillus, 39

Eriocaulon septangulare, 5, 387

Eriogonum annuum, f. **roseum, 347**

Eriophorum opacum, 216; Scheuchzeri, 120, 125; spissum, var. erubescens, 123; tenellum, 5; virginicum, 5

Erodium cicutarium, 363

Errata, 406

Erysimum cheiranthoides, 248; coarctatum, 11

Escobaria Runyonii, 224

Eupatorium coelestinum, 46, f. **illinoense, 46;** falcatum, 24; maculatum, 252; sessilifolium, 39, 290; urticaefolium, var. villicaule, 290

Euphorbia glyptosperma, 287; Helioscopia, 248

Euphrasia, 6, 94–96, 127, 298, 302–304, 373; americana, 306, 307; arctica, 96, 121, 301, 302, 304–306; brevipila, 307; canadensis, 303, 305; disjuncta, 301–304, 306; frigida, 306; latifolia, 302–306; Oakesii, 298–301, 303, f. lilacina, 299; officinalis, 302, 303, officinalis β, 302, 304, 305, var. latifolia, 302, 304, var. rotundifolia, 304–306; purpurea, 9, 299, 303–306, f. candida, 299; var. Farlowii, 96, 127, 301, 303, var. Farlowii, f. iodantha, 301, var. Randii, 300, 303, 304, var. Randii, f. albiflora, 300; rigidula, 399; stricta, 96, 306, 399; Williamsii, 96, 298, 299, 303, 306, var. vestita, 6, 88, 299, 303, 304

Eustoma, 44; exaltatum, 44, f. **albiflorum, 44;** Russellianum, f. albiflorum, 110, f. Fisheri, 110, f. flaviflorum, 110

Falcata comosa, 276; Pitcheri, 276

Family, Adder's Tongue, 352; Club Moss, 355; Curly Grass, 352; Fern, 351; Flowering Fern, 352; Horsetail, 354; Pine, 357; Quillwort, 356; Yew, 357

Fassett, Norman C. Notes from the Herbarium of the University of Wisconsin—IX, 199; X, 387

Fern, Cinnamon, 352; Climbing, 352; Family, 351; Interrupted, 352; Royal, 352

Fernald, M. L. Branching Polygonatum pubescens, 402; Calamagrostis epigejos, var. georgica in America, 64; Callitriche anceps in New England, 185; Diarrhena festucoides again, 39; Glyceria arkansana in western New York, 294; Hawaiian Weeds (notice of

St. John: Weeds of the Pineapple Fields of the Hawaiian Islands), 146; Heterochromism in Arctostaphylos Uva-ursi, var. coactilis, 348; The New York Record of Fraxinus profunda, 293; Recent Discoveries in the Newfoundland Flora, 1, 47, 80, 120, 161, 203, 230, 265, 298, 327, 364, 395; Some Forms of Grasses, 316; The Slender-spiked Spartina pectinata, 258; The Type of Teucrium canadense, 392; Two Segregates in Sporobolus, 108; Types of Some American Species of Elymus, 187
Ferns of North America, A Suppressed Plate in Eaton's, 200
Festuca, 81, 83; brachyphylla, 47, 120, 134, 135; capillata, 12, 132, 134, 135, 273; inermis, β villosa, 316; nutans, 249; ovina, 134, 135, var. duriuscula, 165, f. hispidula, 165, f. laeviflora, 165, var. vivipara, 134, 165; **prolifera, 133**–136, map 14, var. **lasiolepis,** 135, **136,** 399, pl. **241;** rubra, 82, 132–135, var. arenaria, 51, 120, 132, 133, var. commutata, 132, 133, 165, var. fallax, 133, f. glaucescens, 132, 165, var. juncea, 132, 133, 167, f. megastachys, 132, 133, var. multiflora, 132, 133, var. mutica, 132, 133, var. oelandica, 165, f. planifolia, 165, rubra prolifera, 133, var. prolifera, 82, f. squarrosa, 132; Section Ovinae, subsect. Intravaginales, 134; vivipara, 7, 120, 134, 135
Festuceae, 214
Ficus Carica in Massachusetts, 40
Fimbristylis autumnalis, 68
Fir, 358; Balm-of-Gilead, 358; Balsam, 358; Scotch, 357
Flora around Missisquoi Bay, Quebec, The, 247; of Columbia, Missouri, Notes on the, 359; of Haverhill, Massachusetts, Notes on the, 261; of Massachusetts,—II, Reports on the, 351; Recent Discoveries in the Newfoundland, 1, 47, 80, 120, 161, 203, 230, 265, 298, 327, 364, 395
Flowering Fern Family, 352
Forest Trees of New England, Leavitt's (notice), 108
Forms from the Central and Southern United States, New Species and, 44; of Grasses, Some, 316
Fragaria vesca, var. americana, 249; virginiana, 272
Fraxinus nigra, 90, 280; pennsylvanica, 251, 293; profunda, the New York Record of, 293; quadrangulata, 289
Fucus, 64; platycarpus, 151; vesiculosus, 151

Galium circaezans, 250, var. montanum, 309; Claytoni, 252; kamtschaticum, 89, 309, 310, map 25; Littellii, 309; oreganum, 310; palustre, 252
Garden, Some Weeds in an old, 145
Gelidium corneum, 148
Gentiana Amarella, 94–96; nesophila, 60, 94–96; propinqua, 95, 96; puberula, 361; quinquefolia, 289; Saponaria, 255
Genus Antennaria in Newfoundland, The, 327
Geranium Robertianum, 83, 250, 390
Gerardia, 74; laevigata, 202; paupercula, 251; pedicularia, 202, var. ambigens, 202; purpurea, 74; virginica, 202
Geum flavum, 39; triflorum, 388
Gleason, H. A. Annotations on Herbarium Sheets, 41
Glyceria, 321; arkansana in western New York, 294; Fernaldii, 226; fluitans, 273, 294; from the Great Smoky Mountains, A New Species of, 320; grandis, 321, 322, fig.; neogaea, 226; neogaea Steudel, A Note on, 225; **nubigena, 321, fig.;** pallida, var. Fernaldii, 226; septentrionalis, 294
Glycine bracteata, 276; comosa, 276; monoica, 276
Gnaphalium norvegicum, 121; obtusifolium, var. micradenium, 291
Goodale, A. S. Reports on the Flora of Massachusetts,—II, 351
Goodwin, R. H. Reports on the Flora of Massachusetts,—II, 351
Grasses, Some Forms of, 316
Gratiola aurea, 251; sphaerocarpa, 364; virginiana, 364
Gray Pine, 357
Great Lakes, The Distribution of Iris versicolor in Relation to the Post-glacial, 154
Great Smoky Mountains, A new Species of Glyceria from the, 320

Griffithsia Bornetiana, 148; corallina, 148; globulifera, 148
Grigg, F. W. Reports on the Flora of Masaschusetts,—II, 351
Grindelia lanceolata, 290
Ground Hemlock, 357
Grout, A. J. Notice of work, 146
Gustafson, A. H. A Teratological Specimen of Cypripedium acaule 263

Habenaria, 54, 57, 239; albida, 238, 401, pl. 251, var. straminea, 237; blephariglottis, 5, 238, 239; ciliaris, 238, clavellata, 5, 85, dilatata, 238, 277; fimbriata, 238; flava, 251; Hookeri, 57, 215, 239, 240, 401, pl. 252, var. **abbreviata, 239,** 240, 401, pl. **252;** hyperborea, 238; lacera, 362, var. terrae-novae, 241; macrophylla, 238, 239, 240, 398; orbiculata, 8, 57, 87, 88, 215, 238–240, 398, 399, map 9; psycodes, 85, 238, 241; straminea, 52, 53, 57, 120, 121, 125, 237, 238, 401, pl. 251; viridis, var. bracteata, 89
Habitat of Astrophytum asterias in Texas, 224
Hackmatack, 358
Haemodoraceae, 106
Hair-grass, Water, 139
Halenia, 96; deflexa, 94, 95
Halorrhageae, 106
Halosaccion, 315
Hamamelis vernalis, 286
Hamatocactus setispinus, 224
Harris, S. K. Branching Polygonatum pubescens, 403; Notes on the Flora of Haverhill, Massachusetts, 261; Reports on the Flora of Massachusetts,—II, 351; An Undescribed Mutisia from Ecuador, 257
Haverhill, Massachusetts, Notes on the Flora of, 261
Hawaiian Weeds (notice of St. John: Weeds of the Pineapple Fields of the Hawaiian Islands), 146
Hedypnois paludosa, 381, 382
Hedysarum alpinum, 50, 81, 94, 275, var. americanum, f. **albiflorum, 275;** americanum, f. albiflorum, 275
Helenium altissimum, 360, 364
Helianthus, 359; angustifolius, 291; divaricatus, 291; giganteus, var. subtuberosus, 346
Hemlock, 358; Ground, 357
Hepatica, acutiloba, 249; Color Variations in a Missouri Colony of, 66
Herbarium of the University of Wisconsin, Notes from the,—IX, 199, X, 387
Herbarium Sheets, Annotations on, 41
Heterochromism in Arctostaphylos Uva-ursi, var. coactilis, 348
Heuchera, 111, 119; americana, 111, 117; arkansana, 286; ciliata, 116; Curtisii, 115; hispida, 111–119, 363, Identity of, 111; Rediscovered, 118; parviflora, 286; puberula, 286; pubescens, 114, 119; Richardsonii, 113–117, var. **Grayana, 117,** 118, 363, var. **hispidior, 116**–118, var. **typica, 116,** 117; scabra, 114; villosa, 119
Heterophyllum, 146
Hieracium Gronovii, 201; marianum, 201; scabrum, 201
Hierochloe, 77; alpina, 5, 120, 125
Hildenbrandia Prototypus, 151
Holmgrenia, 146
Holosteum umbellatum, 261
Homomallium, 146
Horsetail, 354; Common, 354; Family, 354
Hudsonia, 348; ericoides, 348; tomentosa, 348, var. intermedia, 348
Hydrophyllum virginianum, 250
Hylocomium, 146
Hymenatherum aureum, 182
Hypaelytrum iridifolium, 260; umbellatum, 260
Hypericum boreale, 251; cistifolium, 255; Drummondii, 288; ellipticum, 251; gentianoides, 287; Kalmianum, 388; mutilum, 287; petiolatum, 288; virginicum, 251
Hypnum, 146

Identity of Aster Tradescanti, 312; of Heuchera hispida, Pursh, 111
Ilex verticillata, 287, var. padifolia, 287
Interrupted Fern, 352
Ipomaea coccinea, 289
Iris foliosa, 360, 362; versicolor, 154–160, The Distribution of in Relation to the Post-glacial Great Lakes, 154; virginica, 154–160, 362
Isanthus brachiatus, 388, var. **linearis, 388**
Isnardia palustris, f. submersa, 229

Isoetaceae, 356
Isoetes, 124, 356; Braunii, 356, f. robusta, 356; Dodgei, 356, var. Robbinsii, 356; Eatoni, 356; echinospora, var. Braunii, 356, var. muricata, 356; Engelmanni, 357, var. gracilis, 357; foveolata, var. plenospora, 357; Gravesii, 356; macrospora, 357, var. heterospora, 357; riparia, 356, var. canadensis, 356; saccharata, var. Amesii, 356; Tuckermani, 357, var. Harveyi, 357
Isthmoplea in North America, A Second Station for, 293; sphaerophora, 293

Jordan, David Starr, Algae from Penikese Island, The, 147
Juglans cinerea, 249
Juncus, 84; albescens, 57, 120, 125, 236, 401, pl. 249; × **alpiniformis, 235;** alpino-articulatus, 47, 234, 235; alpinus, 47, 84, 234–236; alpinus × articulatus, 235; alpinus × nodosus, 235; alpinus, var. alpestris, 84, var. fuscescens, 254, var. insignis, 84, 234, 254, var. Marshallii, 234, var. rariflorus, 84, 233, 234; anceps, 236; articulatus, 47, 235, 236; articulatus × brevicaudatus, 236; articulatus, var. obtusatus, 91, 236; balticus, var. littoralis, 252, 253, f. dissitiflorus, 254; brevicaudatus, 236; bufonius, 252, 273; canadensis, 233, var. sparsiflorus, 5, 233; compressus, 391; conglomeratus, 233; diffusissimus, 285; Dudleyi, 91, 233, 252; effusus, var. compactus, 233, var. conglomeratus, 233; filiformis, 251; × **fulvescens, 236;** Gerardi, 90, 233, 292; Greenei, 253; lampocarpus, 235; macer, 391; Marshallii, 233; militaris, 228; × **nodosiformis, 235,** 236; nodosus, 233, 236, 252; nodulosus, 84, 234; nodulosus, β biceps et uniceps, 84; nodulosus, β rariflorus, 234; pelocarpus, 5, 68, 85, 251, 387; rariflorus, 234; stygius, var. americanus, 59; tenuis, 251, 391; trifidus, 5, 93, 120, 125; triglumis, 57, 236, 400, pl. 249
Juniper, 359; Common, 359
Juniperus, 54, 359; communis, 359, var. depressa, 359, var. montana, 5, 239; virginiana, 359

Karwinskia Humboldtiana, 225
Kelso, E. H. Notes on Rocky Mountain Plants, 347
Kelso, Leon. A Note on Glyceria neogaea Steudel, 225
Kidder, Nathaniel T. Some Weeds in an old Garden, 145
Kobresia simpliciuscula, 51, 81, 120
Koberlinia spinosa, 225
Knowlton, Clarence Hinckley, The Flora around Missisquoi Bay, Quebec, 247
Kuhnia suaveolens, 364
Kyllingia granularis, 260; polyphylla, 260

Laboratory, Woods Hole, Notes from the, 1932, 147
Lactuca floridana, 203; ludoviciana, 203; saligna, 291; villosa, 203
Lakela, Olga, Identity of Heuchera hispida Pursh, 111
Laportea canadensis, 249
Lappula Redowskii, var. occidentalis, 182; virginica, 248
Larch, 358; American, 358; Black, 358
Larix, 358; laricina, 122, 358
Lathyrus japonicus, 167, 391, var. aleuticus, 276, var. glaber, 277, var. glaber, f. acutifolius, 277, var. **parviflorus, 390,** var. pellitus, 277, 391; maritimus, 391; palustris, 363; pratensis, 15, 277, 278
Leavitt's Forest Trees of New England (notice), 108
Lecanora allophana, 150; Hageni, 150
Lechea villosa, 288
Leersia lenticularis, 284; oryzoides, 251; virginica, 251
Leontodon ceratophorus, 373; erythrospermum, 379; laevigatus, 379; latilobum, 377; officinalis, 380; palustre, 380–382; Raji, 380; Taraxacum, 380; Taracaxum palustre, 380, 381; Taraxacum, δ palustre, 380, 381; Taraxacum, var. palustre, 381; Taraxacum, δ vulgare, 380; vulgare, 380, 382
Lespedeza, 38; procumbens, 39; virginica, 39
Lesquerella, 55, 81, 127, 269, 373; arctica, 55, 267–270, 401, pl. 258, var. Purshii, 55, 267, 270, pl. 240; montevidensis, 270; **Purshii, 267–270,** 338, 399, 401, pl. 240, **258**

Leucocrinum montanum, var. **fibrosum, 348**
Leucophyllum texanum, 225
Lewis, I. F. Notes from the Woods Hole Laboratory,—1932, 147
Liatris cylindracea, 388; elegans, 361; spicata, 361; squarrosa, 290
Lichens of the 1924 Survey, Penikese, 149
Ligusticum canadense, 288
Lilium michiganense, 362; superbum, 362
Linum catharticum, 15, 277, 278; medium, 363; sulcatum, 388
Listera, 61; borealis, 60, 61, 241; convallarioides, 277
Lithospermum officinale, 248
Lobelia cardinalis, 252, 360, 364; Dortmanna, 85, 87, 311, map 8; Kalmii, 91; syphilitica, 360
Loiseleuria procumbens, 5, 121, 125, 233
Lomentaria rosea, 151; uncinata, 148
Lonicera japonica, 364; villosa, 122
Lophophora Williamsii, 224, 225
Louisiana, Wolfiella lingulata in, 226
Ludvigia **brevipes, 228;** from New England, A New, 227; **lacustris, 228,** f. **aquatilis, 229;** palustris, 227, f. **submersa, 229;** sphaerocarpa, 227
Ludvigiantha arcuata, 227; brevipes, 227, 228
Luzula campestris, var. acadiensis, 144, 237, var. alpina, 93, 120, 237; spicata, 7, 81, 120, 298; sudetica, 94, 237
Lychnis alba, 362; alpina, 83, 120
Lycopodiaceae, 355
Lycopodium, 106, 355; alopecuroides, 355; annotinum, 355, var. acrifolium, 355, var. pungens, 5; carolinianum, 106; clavatum, 130, 355, var. megastachyon, 355, var. monostachyon, 355; complanatum, var. canadense, 130, var. flabelliforme, 356; inundatum, 355, var. alopecuroides, 355, var. Bigelovii, 355, var. robustum, 355; obscurum, 130, 356, var. dendroideum, 356; sabinaefolium, var. sitchense, 130; Selago, 5, 121, 355; tristachyum, 94, 130, 356
Lycopus uniflorus, 282
Lygodium, 352; palmatum, 352
Lysimachia Nummularia, 289; × producta, 39; terrestris, 280
Maianthemum canadense, 155
Maidenhair Berry, 129
Maine, Dumontia in, 315; Notes on Triglochin palustris and Montia lamprosperma in, 291; A Third Station for Waldsteinia fragarioides in, 322
Malaxis brachypoda, 61, 241, 242, 401, pl. 253; monophyllos, 61, 242, 401, pl. 253; var. brachypoda, 242
Marine Algae, New Records of, 151
Mariscus mexicanus, 260
Marsilea, 354; quadrifolia, 354
Marsileaceae, 354
Massachusetts, Cynoglossum amabile in, 66; Ficus Carica in, 40; Reports on the Flora of,—II, 351; Another Station for Calluna vulgaris in, 294
Mecardonia acuminata, 289
Melica caerulea, 137; striata, 249
Melilotus alba, 248
Menyanthes trifoliata, 251
Mikania scandens, 290
Mimosa pallida, 225
Mimulus moschatus, 282
Missisquoi Bay, Quebec, The Flora around, 247
Missouri Colony of Hepatica acutiloba, Color Variation in a, 66; Notes on the Flora of Columbia, 359; Plants, Notes on, 283
Mitella diphylla, 249; prostrata, 249
Mittenothamnium, 146
Molinia, 137; caerulea, 137
Monarda didyma, 320; punctata, 363
Monolepis chenopodioides, 182
Moonwort, 353
Moss Flora (notice of Grout: Moss Flora of North America), 146
Montia lamprosperma, 292, in Maine, Notes on Triglochin palustris and, 291; rivularis, 273
Muhlenbergia, 181, 214; cuspidata, 284; uniflora, 215, var. terrae-novae, 5, 85, 214, 215, 399, pl. 241
Multiflori Section of Aster, A Study of the Rocky Mountain Species of the, 323
Mutisia from Ecuador, An undescribed, 257; pinchinchense, 257; **Rimbachii, 257,** 258
Myosotis laxa, 90; scorpioides, 90
Myosurus minimus, 362
Myrica Gale, 238, 251
Myriotrichia, 256; clavaeformis,

149, 256; densa in New England, 256; filiformis, 256
Myriophyllum, 124

Najas flexilis, 14
Nardus stricta, 203, 273
National Academy of Sciences, Aid from, 16, 111, 147, 154, 187, 199, 227, 252, 258, 283, 295, 316, 320, 323, 348, 359, 387, 392
Nelson, Ruth Ashton, A Study of the Rocky Mountain Species of the Multiflori Section of Aster, 323
Neomammillaria hemisphaerica, 224, 406; multiceps, 224
Nepeta Cataria, 248; hederacea, 364
New Ludvigia from New England, A, 227; Records of Marine Algae, 151; Species and Forms from the Central and Southern United States, 44; Species of Glyceria from the Great Smoky Mountains, 320
New England, Ectocarpus paradoxus in, 107; Callitriche anceps in, 185; Leavitt's Forest Trees of (notice), 108; Myriotrichia densa in, 256; A New Ludvigia from, 227; On Polysiphonia fibrillosa in, 391
Newfoundland Flora, Recent Discoveries in the, 1, 47, 80, 120, 161, 203, 230, 265, 298, 327, 364, 395; The Genus Antennaria in, 327
New Hampshire, Panicum dichotomiflorum, var. puritanorum in, 68
New York, Glyceria arkansana in western, 294; Record of Fraxinus profunda, The, 293
North America, Agropyron, § Goularda in Eastern, 161; Carex alpina in, 220; A Second Station for Isthmoplea in, 293; Taraxacum in Eastern, 369
Northern Scrub Pine, 357
Norton, Arthur H. Notes on Triglochin palustris and Montia lamprosperma in Maine, 291; Rorippa amphibia in Androscoggin County, Maine, 262; A Third Station for Waldsteinia fragarioides in Maine, 322
Norway Spruce, 358
Note on Glyceria neogaea Steudel, 225
Notes from the Herbarium of the University of Wisconsin,—IX, 199, X, 387; from southeastern Wisconsin,—II, 252; from the Woods Hole Laboratory,—1932, 147; on Missouri Plants, 283; on Rocky Mountain Plants, 347; on the Flora of Columbia, Missouri, 359; on the Flora of Haverhill, Massachusetts, 261; on Triglochin palustris and Montia lamprosperma in Maine, 291
Notholaena dealbata, 361
Nymphozanthus variegatus, 5
Nyssa, 106; aquatica, 200; sylvatica, 200; sylvatica biflora, 200; sylvatica, var. biflora, 200

Oenothera biennis, 94; perennis, 279
On Polysiphonia fibrillosa in New England, 391; the Distribution of Sorocarpus, 347
Onoclea sensibilis, 360
Ophioglossaceae, 352
Ophioglossum, 352; vulgatum, 352, f. pseudopodum, 352
Opuntia humifusa, 348; leptocaulis, 225; Lindheimeri, 225; vulgaris, 348
Orchis, 239; orbiculata, 398; psycodes, 241; spectabilis, 360
Orobanche, 308; Sedi, 308; terrae-novae, 48, 95, 308, fig., 308; uniflora, 95, 308, fig., 308, var. terrae-novae, 308
Oryzopsis asperifolia, 215; canadensis, 13, 215; pungens, 215; racemosa, 249
Osmorhiza Claytoni, 250; divaricata, 387; longistylis, 250
Osmunda, 352; cinnamomea, 59, 352, f. bipinnatifida, 352, f. frondosa, 352, 405, var. frondosa, 352, f. incisa, 352, var. incisa, 352, f. latipinnula, 352; Claytoniana, 59, 352; regalis, var. spectabilis, 352, f. **anomala, 352,** subvar. anomala, 352
Osmundaceae, 352
Ostrya virginica, 249
Oxalis corniculata, 200; europaea, 200; filipes, 200; montana, 77, 321, 322; stricta, 200
Oxybaphus hirsutus, 199
Oxyria digyna, 93, 120, 265, map 11
Oxytropis foliolosa, 50, 274, map 3; johannensis, 89, 275; plattensis, 287; terrae-novae, 275, map 22
Panicum boreale, 201, 202; Boscii, var. molle, 39; dichotomiflorum, var. puritanorum in New Hamp-

shire, 68; Lindheimeri, var. septentrionale, 284; oligosanthes, 284; sphaerocarpon, 284; spretum 202; virgatum, var. cubense, 158; xalapense, 362
Parentucellia, 303, 305; latifolia, 303
Parietaria pennsylvanica, 249
Parmelia caperata, 150; sulcata, 150
Parnassia caroliniana, 59, 61, 91, 271; Kotzebuei, 275; parviflora, 51, 59
Parthenocissus quinquefolia, var. Saint-Paulii, 287
Paspalum floridanum, 283
Pedicularis flammea, 121; sylvatica, 273
Penikese Island, The David Starr Jordan Algae from, 147
Penikese Lichens of the 1924 Survey, 149
Penstemon grandiflorus, 255
Penthorum sedoides, 251, 360
Pentstemon tubiflorus, 364
Phaseolus marianus scandens, 276
Phegopteris hexagonoptera, 360, 361
Phleum alpinum, 215
Phryma Leptostachya, 250
Phyllodoce caerulea, 58, 89, 279
Phyllophora Brodaei, 148; membranifolia, 148
Physalis Alkekengi, 201, 406; angulata, 201; barbadensis, 201; pendula, 201; pruinosa, 201
Physcia stellaris, 150
Phytolacca americana, 254
Picea, 358; Abies, 358; canadensis, 358; glauca, 122, 358; mariana, 90, 122, 358; rubens, 358; f. virgata, 358; rubra, 322, 358
Pilea pumila, 249
Pinaceae, 357
Pine, 357; Family, 357; Gray, 357; Northern Scrub, 357; Pitch, 357; Red, 357; Scotch, 357; White, 357
Pinus, 357; Banksiana, 357; echinata, 291; resinosa, 357; rigida, 357; Strobus, 11, 130, 154, 314, 357, f. prostrata, 11, 130; sylvestris, 357
Pitch Pine, 357
Plagiothecium, 146
Plantago arenaria, 262; aristata, 255; decipiens, 127; juncoides, 127, 336, var. glauca, 399, pl. 240, var. laurentiana, 9; lanceolata, var. sphaerostachya, f. vernalis, 309; major, 309, var. asiatica, 92, 308; Purshii, 255
Plants, Notes on Missouri, 283; Notes on Rocky Mountain, 347
Platanthera bifolia, 54
Plate in Eaton's Ferns of North America, A Suppressed, 260
Platygyrium, 146
Poa, 81; alpina, 120, 127, pl. 240, var. brevifolia, 399, pl. 240; Chapmaniana, 261; glauca, 83; laxa, 58, 136; nemoralis, 317; saltuensis, var. microlepis, 136; trivialis, 83, 136
Podophyllum peltatum, 76
Pogonia ophioglossoides, 5, 85, 241
Polygala Senega, var. latifolia, 255; verticillata, var. ambigua, 361
Polygonatum multiflorum, 404; multiflorum, γ bracteatum, 404; multiflorum, f. **bracteatum, 404,** f. **ramosum, 404,** var. ramosum, 404; pubescens, 403–405, Branching, 403, f. **fultius, 404–406 fig.**
Polygonum allocarpum, 13, 265; buxiforme, 362; littorale, 362; Raii, 167; sagittatum, 360, 362; virginianum, 39; viviparum, 120
Polyides rotundus, 149
Polymnia canadensis, 255
Polypodiaceae, 351
Polypremum procumbens, 289
Polysiphonia affinis, 148; atrorubescens, 148; fibrillosa in New England, On, 391; nigrescens, 148; urceolata, 148; violacea, 148
Polystichum acrostichoides, 252; Lonchitis, 47, 81, 390; mohrioides, 336
Populus deltoides, 250; taccamahacca, 122
Post-glacial Great Lakes, The Distribution of Iris versicolor in relation to the, 154
Potamogeton, 124; bupleuroides, 131; confervoides, 85, 131; gramineus, var. spathulaeformis, 131; Oakesianus, 5, 85; polygonifolius, 273; praelongus, 14, 131; Robbinsii, 388, f. **cultellatus, 389**
Potentilla alpestris, 121; Anserina, 250, 251, 273; Anserina, α argentea, 273; Anserina, var. argentea, 273; Anserina, β concolor, 273; Anserina, β holosericea, 273; Anserina, f. **sericea, 273,** 274; var. sericea, 273; Anserina,

α unicolor, 273; Anserina, var. vulgaris, 273; concolor, 273; erecta, 273; Fragariastrum, 272; fruticosa, 122, 126, 399, pl. 240; nivea, 51, 81, 121, 126, 298, pl. 240, var. macrophylla, 399, pl. 240; norvegica, var. labradorica, 89, 272; palustris, 251, f. subsericea, 273, 274; pectinata, 9, 233, 272; procumbens, 273; sericea, 273; sterilis, 272, 273; Tormentilla, 273; tridentata, 125; ustacapensis, 275
Potter, David. Reports on the Flora of Massachusetts,—II, 351
Prenanthes altissima, var. cinnamomea, 291; aspera, 361
Primula decipiens, 335; egaliksensis, 280; § Farinosae, 335; intercedens, 388; laurentiana, 51, 233; magellanica, 335; mistassinica, 51
Prosopis juliflora, 225
Prunella vulgaris, var. lanceolata, 282
Prunus virginiana, 274
Psedera quinquefolia, var. Saint-Paulii, 287
Psoralea digitata, 361
Puccinellia maritima, 167; Nuttalliana, 182
Pylaiella, 63; fulvescens, 63, 64; littoralis, 64
Pylaisia, 146
Pyrola minor, 277; rotundifolia, 84
Pyrus americana, 322, § Sorbus, 122

Quebec, The Flora around Missisquoi Bay, 247
Quercus borealis, 391; depressa, 296; ellipsoidalis, 295; macrocarpa, 249, 295–297, var. depressa, 295–297, var. olivaeformis, 296; mandanensis, 296, 297; obtusiloba, 295; obtusiloba, β depressa, 295, 296; rubra, 391; stellata, 295, 296; stellata, γ depressa, 295
Quillwort, 356; Family, 356

Ramalina calicaris, 150
Ranunculus Flammula, 273; hederaceus, 273; hyperboreus, 120, 125; Macounii, 59; pedatifidus, var. leiocarpus, 120, 275; pennsylvanicus, 251; reptans, 251
Recent Discoveries in the Newfoundland Flora, 1, 47, 80, 120, 161, 203, 230, 265, 298, 327, 384, 395
Record of Fraxinus profunda, The New York, 293
Records of Marine Algae, New, 151
Red Cedar, 359; Pine, 357; Spruce, 358
Reports on the Flora of Massachusetts,—II, 351
Rhamnus cathartica, 363; parvifolius, 112
Rhododendron lapponicum, 10, 51, 81, 121
Rhodophyceae, 315
Rhus canadensis, 388, var. trilobata, 363; Toxicodendron, 249; typhina, 249
Rhytidiadelphus, 146
Rhytidiopsis, 146
Rhytidium, 146
Ribes Cynosbati, 249; glandulosum, 122; hirtellum, var. saxosum, 272
Robbins, Charles Albert, 1874–1930 (biographical sketch), 140
Robinson, B. L. Leavitt's Forest Trees of New England (notice), 108
Rockberry, 12
Rocky Mountain Plants, Notes on, 347; Species of the Multiflori Section of Aster, A Study of the, 323
Rorippa amphibia, in Androscoggin County, Maine, 262
Rosa setigera, var. tomentosa, f. inermis, 286
Rosendahl, C. O. Identity of Heuchera hispida Pursh, 111
Rossbach, G. B. Reports on the Flora of Massachusetts,—II, 351
Royal Fern, 352
Rubus, 359; abactus, 363; acaulis, 238; Chamaemorus, 5; occidentalis, 250; odoratus, 249; ostryifolius, 363
Rudbeckia fulgida, 364; laciniata, 320; subtomentosa, 360, 364
Rumex Patientia, 251; verticillatus, 251
Ruppia maritima, 91, var. brevirostris, 91, 131, var. intermedia, 91, 131, var. obliqua, 91, 131, var. rostrata, 131
Rynchospora alba, 5, 85; capillacea, 216, 253, var. leviseta, 216, 388; corniculata, 202; fusca, 5, 85; macrostachya, 202

Sagittaria heterophylla, 361
Salix, 52, 122; alaxensis, 245; amoena, 247; amplifolia, 245;

ancorifera, 245–247, fig., 245; anglorum, var. kophophylla, 10, 83; arctophila, 55, 120; Barclayi, 48, 246; Barclayi* S. latiuscula, 246; Barclayi, subsp. latiuscula, 48; Barclayi, β latiuscula, 246; Bebbiana, var. projecta, 12; calcicola, 55, 244; candida, 55; chlorolepis, 247; § Chrysanthae, 243, 244; cordata, 91, 242, 251; cordifolia, 55, var. callicarpaea, 89, 242, var. Macounii, 10, 83; discolor, 48, 245–247, 251; glaucophylloides, 91, 243; herbacea, 58, 242; Hookeriana, 245; lanata, 54, 55, 243, 245; § Lanatae, 244; latiuscula, 246, 247; laurentiana, 244, 245; leiolepis, 247; lucida, 91, 251, var. intonsa, 91, 242; nigra, 250, var. falcata, 252; obtusata, 247; pedunculata, 55, 243, 247; pellita, 91; petiolaris, 252; phylicifolia, 48, 246; Piperi, 245; reticulata, 55, 120; Richardsoni, 244, 245; rostrata, 251; Tweedyi, 245; Uva-ursi, 5, 55, 125, f. **phyllolepis, 242**; vestita, 50, 55, 81, 89, 238; viminalis, 48, 247; **Wiegandii, 243**–245, 247, 401, pl. **254**

Salsola Kali, var. caroliniana, 265

Salviniaceae, 354

Sambucus pubens, 310, f. **calva, 310**; pubens dissecta, 310; pubens, f. **dissecta, 310**; pubens, β leucocarpa, 310; pubens, f. **leucocarpa, 310**, f. **xanthocarpa, 310**; racemosa, 310, f. chrysocarpa, 310, f. leucocarpa, 310, f. xanthocarpa, 310, var. xanthocarpa, 310

Sanderson, Ruth D. A Suppressed Plate in Eaton's Ferns of North America, 260

Sanford, S. N. F. Cynoglossum amabile in Massachusetts, 66; Ficus Carica in Massachusetts, 40; Reports on the Flora of Massachusetts,—II, 351

Sanguinaria canadensis, 249, 250, f. **Colbyorum, 45**

Sanguisorba canadensis, 238

Sarracenia purpurea, 5, f. heterophylla, 90, 271

Savin, 359

Saxifraga adscendens, 271; aizoides, 7, 121; Aizoon, 121, 233; cespitosa, 121, 126, 399, pl. 239; cernua, 298; oppositifolia, 78, 81, 93, 121, 126, 399, map 1, pl. 239; pensylvanica, 286, var. Forbesii, 286; petraea, 271; tricuspidata, 271

Scheuchzeria palustris, var. americana, 90, 132

Schizaea, 13, 106; pusilla, 6, 85, 86, 105, map 7

Schizaeaceae, 106, 352

Schuh, R. E. Dumontia in Maine, 315; Ectocarpus paradoxus in New England, 107; Myriotrichia densa in New England, 256; On Polysiphonia fibrillosa in New England, 391; On the Distribution of Sorocarpus, 347; Pylaiella fulvescens (Schousb.) Bornet, 63; A Second Station for Isthmoplea in North America, 293

Scinaia furcellata, 149

Scirpus acutus, 216; americanus, 90, 216, 251; atrovirens, 251, 252, var. georgianus, 252; carinatus, 285; cespitosus, var. callosus, 5, 8, 87, 88, 121, 240, map 10, var. delicatulus, 216; cyperinus, var. pelius, 251; nanus, 90, 215; pedicellatus, 251, 262; rufus, 55

Scleria pauciflora, 202, var. caroliniana, 202

Scotch Fir, 357; Pine, 357

Scrophularia nodosa, 16, 277, 282

Scutellaria epilobiifolia, 252; lateriflora, 252; nervosa, 289; versicolor, var. minor, 289

Scytosiphon, 257

Second Station for Isthmoplea in North America, A, 293

Sedum roseum, 121, 127

Segregates in Sporobolus, Two, 108

Selaginella, 356; apoda, 356; rupestris, 356

Selaginellaceae, 356

Sematophyllum, 146

Senecio pauperculus, 126, pl. 239; var. firmifolius, 399, pl. 239; Pseudo-Arnica, 233; Rugelia, 320

Senecioneae, 369

Sertularia, 293

Sesbania macrocarpa, 286

Sheets, Annotations on Herbarium, 41

Shepherdia canadensis, 50

Shimek, B. Quercus macrocarpa, var. depressa (Nutt.) Engelm., 295

Silene acaulis, 8, var. exscapa, 7, 81, 93, 94, 120, 266, var. exscapa, f. caulescens, 94, 266; dichotoma, 254; gallica, 285

Silphium Asteriscus, 291
Sisymbrium orientale, 145; Sophia, 145
Sisyrinchium montanum, 388
Sium suave, 251
Slender-spiked Spartina pectinata, The, 258
Smith, L. B. Reports on the Flora of Massachusetts,—II, 351
Solanum elaeagnifolium, f. albiflorum, 110, f. Benkei, 110; nigrum, var. villosum, 145
Solidago altissima, 252; arguta, 202; caesia, 250, 290; calcicola, 88, 311; canadensis, 94, 311; flexuosa, 391; Gattingeri, 290; hispida, var. arnoglossa, 7, 311, var. disjuncta, 311, var. lanata, 311, var. tonsa, 83; latifolia, 250, 391; lepida, var. elongata, 91, 311; macrophylla, 126, pl. 239, var. thyrsoidea, 399, pl. 239; multiradiata, 51, 81, 89; patula, 202; rugosa, 8, var. aspera, 290; speciosa, 364; ulmifolia, 39; uniligulata, 5
Some Forms of Grasses, 316; Synonymy, 110; Weeds in an old Garden, 145
Southern United States, New Species and Forms from the Central and, 44
Sorocarpus, On the Distribution of, 347; uvaeformis, 347, var. balticus, 347
Sparganium, 124; hyperboreum, 85; multipedunculatum, 131
Spartina cynosuroides, 258; Michauxiana, 251, 258, 259, var. Suttiei, 260; patens, 292; pectinata, 215, 258–260, The Slender-spiked, 258, var. **Suttiei, 260;** polystachya, 258
Species and Forms from the Central and Southern United States, 44
Species of Elymus, The Types of some American, 187; of Glyceria from the Great Smoky Mountains, A New, 320; of the Multiflori Section of Aster, A Study of the Rocky Mountain, 323
Specimen of Cypripedium acaule, A Teratological, 263
Specularia leptocarpa, 364
Spermothamnion Turneri, 150
Sphacelaria californica, 152; plumigera, 151–153, pl. 274; plumosa, 151, 152
Sphenopholis pallens, 81, 203, 250
Spiraea alba, 251; salicifolia, 251
Spiranthes ovalis, 285
Spleenwort, 351
Sporobolus, 108, 182; asper, 109, 362; asper pilosus, 110; canovirens, 284; neglectus, 109; **ozarkanus, 109;** pilosus, 109; Two Segregates in, 108; vaginaeflorus, 108, 109, var. **inaequalis, 109**
Spruce, 358; Black, 358; Bog, 358; Cat, 358; Norway, 358; Red, 358; White, 358
Stachys agraria, 45, f. **albiflora, 45;** aspera, var. tenuifolia, 252; cordata, 200; tenuifolia, var. aspera, 201
Standley, P. C. Some Synonymy, 110
Statice labradorica, 83, var. submutica, 121
Station for Calluna vulgaris, Another Massachusetts, 294; for Isthmoplea in North America, A Second, 293; for Waldsteinia fragarioides in Maine, A Third, 322
Steironema ciliatum, 251
Stellaria crassifolia, 265; humifusa, 121
Stereophyllum, 146
Steyermark, Julian A. Notes on Missouri Plants, 283
Stipa canadensis, 215
St. John, Harold (notice of work), 146
Streptopus amplexifolius, 277; oreopolus, 58, 237; roseus, 322
Strophostyles helvola, 287
Study of the Rocky Mountain Species of the Multiflori Section of Aster, A, 323
Suaeda maritima, 167
Sullivantia renifolia, 286
Suppressed Plate in Eaton's Ferns of North America, A, 260
Survey, Lichens of the Penikese, 1924, 149
Synonymy, Some, 110

Tagetes minuta, 145
Talinum calycinum, 285; rugospermum, 202; teretifolium, 202
Tamarack, 358
Tamarix gallica, 288
Tanacetum huronense, var. terrae-novae, 55
Taraxacum, 13, 50–53, 60, 121, 274, 369–386; in Eastern North America, 369; **ambigens,** 372, **376,** 377, 403, pl. **271,** var. **fultius,**

376, 403, 406, pl. **271;** § Taraxaca antarctica, 373; arctogenum, 378; ceratophorum, 370, 371, 373–379, 384–386, 403; pl. 271; croceum, 122, 383; cygnorum, 373; Densleonis, 380, 382, var. officinale, 380; dumetorum, 374–376, 379, 403, pl. 272; erythrospermum, 379; groenlandicum, 374, 378, 384; Hjeltii, 375; hyparcticum, 373; lacerum, 370, 378, 379; laevigatum, 372, 379; lapponicum, 122, 370, 372, 377, 383, 386, 403, pl. 271; latilobum, 372, 376–378, 403, pl. 273; **laurentianum,** 371, **375,** 403, pl. **272; Longii,** 372, **379,** 403, pl. **273;** lyratum, 370, 372, 373, 403, pl. 272; macroceras, 379; magellanicum, 373; melanocarpum, 373; mutilum, 378; norvegicum, 379; officinale, 377, 380, 382; officinale, β palustre, 380; officinarum, δ palustre, 380; palustre, 372, 380–383, var. **vulgare,** 377, **380,** 383; paludosum, 381, 382; phymatocarpum, 121, 122, 370–372, 403, map 12, pl. 272; pumilum, 373; Taraxacum, 380; **torngatense,** 373, **385,** 386, 403, pl. **273;** vulgare, 377, 380–383, var. ceratophorum, 373
Taxaceae, 357
Taxithelium, 146
Taxus, 357; canadensis, 277, 357
Taylor, William Randolph, Epidemic among Zostera Colonies, 186; Notes from the Woods Hole Laboratory,—1932, 147
Teratological Specimen of Cypripedium acaule, A, 263
Terellia canadensis, 191; canadensis glaucifolia, 192
Teucrium canadense, 392–395; The Type of, 392; canadense littorale, 200; canadense, var. littorale, 393, 395, var. virginicum, 395; foliis lanceolatis, 394; littorale, 393–395; occidentale, 200; sibiricum, 394; virginicum, 395
Texas, The Habitat of Astrophytum asterias in, 224
Thalictrum alpinum, 120, 125, 266; clavatum, 266; confine, 250; dasycarpum, 360, 362; dioicum, 249
Thelocactus bicolor, 225
Thelypteris cristata, 59, 128; Dryopteris, 277; hexagonoptera, 361; noveboracnesis, 84, 128; palustris, var. pubescens, 200; Phegopteris, 277; Robertiana, 47, 51, 81, 128; spinulosa, var. americana, 320, 322
Third Station for Waldsteinia fragarioides in Maine, 322
Thlaspi arvense, 363; perfoliatum, 285
Thuidium, 146
Thuja, 250, 359; occidentalis, 249, 359
Tilopteridaceae, 151
Tilopteris Mertensii, 151, 153, pl. 274
Tofieldia glutinosa, 91; minima, 89, 120
Tragia nepetaefolia, 287; urticaefolia, 287
Trailiella intricata, 149, 150
Tribulus terrestris, 363
Trichodium concinnum, 204, 205; laxiflorum, 209; montanum, 209
Trichomanes ramosum, 47
Tricuspis stricta, 284
Tridens strictus, 284
Triglochin palustris, 292; palustris and Montia lamprosperma in Maine, Notes on, 291
Trillium cernuum, 90, 237; grandiflorum, 249; recurvatum, 362
Triosteum aurantiacum, 364; perfoliatum, var. aurantiacum, 364
Tripterocladium, 146
Trisetum spicatum, 250
Triticum biflorum, β Hornemanni, 164, 171, 174; junceum × repens, 167; pauciflorum, 163, 168, 169, 171; repens, 184, var. aristatum, 184, var. β pubescens, 184; subsecundum, 162, 180; subulatum, 184; trachycaulum, 162, 169; Vaillantianum, 184; violaceum, 164
Tsuga, 358; canadensis, 358
Two Segregates in Sporobolus, 108
Type of Teucrium canadense, The, 392
Types of some American Species of Elymus, 187
Typha, 90, 155; angustifolia, 252, 391; latifolia, 90, 131, 252

Ulmus americana, 249; fulva, 249
Umbelliferae, 79
Uncinia, 139
Undescribed Mutisia from Ecuador, An, 257
United States, New Species and

Missouri Botanical Garden Library
3 1753 00341 3553

Forms from the Central and Southern, 44
University of Wisconsin, Notes from the Herbarium of the,—IX, 199, X, 387
Upham, Alan W. Desmodium glabellum in northeastern Connecticut, 38
Utricularia, 124; biflora, 289; clandestina, 85; cornuta, 5; geminiscapa, 85, map 6

Vaccinium arboreum, var. glaucescens, 288; cespitosum, 280, 402, pl. 260; nubigenum, 58, 279, 280, 402, map 23, pl. 260; ovalifolium, 58, 280, 402, pl. 260; uliginosum, var. alpinum, 5, 121, 239; vacillans, 363, var. crinitum, 363
Valerianella longiflora, 289
Variation in a Missouri Colony of Hepatica acutiloba, Color, 66
Variations of Agropyron repens, The American, 182; of Agrostis borealis, 203
Vegetation, Changes in the Woods Hole Algal, 150
Veratrum Woodii, 285
Verbena officinalis, 44, f. **roseiflora, 45**
Verbesina encelioides, var. exauriculata, 145
Vernonia, 201, 359; altissima, 202; Baldwini, 201, 290; Baldwini × crinita, 290; crinita, 290; fasciculata, 201, 202; glauca, 201; illinoensis, 201; missurica, 201, 202; noveboracensis, 199, 201, var. latifolia, 201
Veronica humifusa, 58; officinalis, 282, var. Tournefortii, 282, 283
Vesicaria arctica, 269; montevidensis, 270
Vesicularia, 146
Viburnum Bushii, 364; pauciflorum, 122
Vicia Cracca, 248, 363, var. sericea, 276; villosa, 363
Viola canadensis, 250; conspersa, 250; eriocarpa, 250; labradorica, 5; lanceolata, 288; missouriensis, 363; pallens, 288; palustris, 58, 278; rostrata, 250; sagittata, 363; sororia, 250
Vitis cinerea, 202; labrusca, 202; vulpina, 250

Wadmond, S. C. Notes from southeastern Wisconsin,—II, 252
Waldsteinia fragarioides, in Maine, A third Station for, 322
Walter Deane (biographical sketch), 69
Water Hair-grass, 139
Weatherby, C. A. Aristida longespica in Connecticut, 386; Panicum dichotomiflorum, var. puritanorum in New Hampshire, 68; Walter Deane, 69
Weeds in an old Garden, Some, 145
Wherry, Edgar T. Heuchera hispida Pursh Rediscovered, 118
White Adder's Mouth, 242; Cedar, 358, 359; Pine, 357; Spruce, 358
Widdy, 126
Wiegand, K. M. Aster paniculatus and some of its Relatives, 16
Wilcoxia Poselgeri, 225
Wisconsin, Notes from the Herbarium of the University of,—IX, 199, X, 387; Notes from southeastern,—II, 252
Wolfiella lingulata, 226, in Louisiana, 226
Woods Hole Algal Vegetation, Changes in the, 150; Notes from the Laboratory,—1932, 147
Woodsia, 390; alpina, 89, 128; Cathcartiana, 389; glabella, 47, 81, 120, 128; ilvensis, 88, 89; mexicana, 389; oregana, 389

Xanthoria parietina, 150
Xyridaceae, 106
Xyris, 5, 13; montana, 5; Smalliana, 227

Yew, 357; American, 357; Family, 357
Yucca sp., 225

Zannichellia palustris, var. major, 91
Zeia pseudorepens, 171; tenera, 170
Zizia aurea, 46; Bebbii, 46; cordata, 45, 46; **sylvatica**, 45, **46**
Zizania aquatica, 251, var. angustifolia, 251
Zostera, 153, 257, 392; Colonies, Epidemic among, 186; Disappearance of in 1932, 152; marina, 92, 152, var. pacifica, 92, var. stenophylla, 92, 186; pacifica, 92; stenophylla, 92
Zygadenus chloranthus, 285
Zygnema, 63